

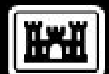
Micro PAVER Version 5.2

# User Manual

Released January 2004

**Micro  
PAVER**

5.2



US Army Corps  
of Engineers

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# Micro PAVER 5.2 User Manual

**US Army Corps of Engineers**  
**Construction Engineering Research Laboratory**

**Dr. M.Y. Shahin, PAVER Principal Investigator**

**Dr. Simon Kim, Research Associate**

**Jeffrey A. Burkhalter, Research Associate**

**Kurt A. Keifer, Research Associate**

**Gregory A. Wilken, Research Assistant**

**Shauna K. Shepston, Research Assistant**

**Kevin A. Hoene, Research Assistant**

**Amir M. Moid, Research Assistant**

**Scott J. McDonald, Technical Specialist**

**Christina Eng, Research Assistant**

**Craig A. Loudon, Research Assistant**

US Army Corps of Engineers CERL

<http://www.cecer.army.mil>

<http://www.cecer.army.mil/paver>

# Acknowledgments

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The pavement management research and development of the PAVER system have been in progress since the early 1970's. These efforts have been sponsored and funded by several agencies. Special thanks is due to the following agencies and their representatives who supported and shared in the development efforts over the years:

- > **The US Air Force:** Roy Almendarez, Jay Beam, Carl Borgwald, Don Brown, John Duvall, Jim Greene, Wayne Hudson, Charles McCarol, Ed Miller, Michael Myers, Caren Ouellete, William Peacock, Cliff Sanders, Michael Sawyer, Mark Schumaker, Mike Womack, and Charles York.
- > **The US Army:** Ali Achmar, Bill Borque, Dan Boyer, Gary Cox, Mike Dean, Mike Flaherty, Ken Gregg, Jack Hinte, Bob Lubbert, Stan Nickell, Leo Price, Paul Styer, Bill Taylor, and Bob Williams.
- > **The US Navy:** Greg Cline, Vince Donnally, Mel Hironaka, Charlie Schiavino, Dean Shabeldeen, and Harry Singh.
- > **The Federal Aviation Administration (FAA):** Satish Agrawal, Fred Horn, Michel Hovan, Rodney Joel, Xiaogong Lee, Wayne Marsey, Aston McLaughlin, Jack Scott, and Dick Worch.
- > **The Federal Highway Administration (FHWA):** Frank Botelho, Sonya Hill, Bob Kelly, Ray McCormick, and Lewis Rodriguez.
- > **The American Public Works Association (APWA):** Jim Ewing, Teresa Hon, Christine Johnson, John MacMullen, Dennis Ross, and Dick Sullivan.

Special thanks is due to the Micro PAVER users who have participated for many years in the annual Sponsor/User Group meetings and provided significant feedback for the continuous development of the system. These members include Greg Belancio, Mike Black, Chuck Calloway, Paul Clutts, Andy Doll, Judie Greeson, Mark Justice, Sabine Lundgren, Steve McNeely, Rod Oshiro, Justin Rabidoux, Jeffrey Sabiel, Robert Vandertang, and Janpiet Verbeek.

Thanks is due to the CERL research team and University of Illinois Research Assistants who have helped with Micro PAVER over the years: Lisa Beckberger, Margaret Broten, Jeff Burkhalter, Abbas Butt, Mercedes Croveti, Christina Eng, K. J. Feighan, Jim Hall, John Heflin, Rich Hoffman, Kurt Keifer, Charles Kemper, Starr Kohn, Ruth Lehmann, Craig Loudon, Scott McDonald, Jeffrey Morton, Gary Nelson, Dixon O'Brien, Mark Owens, B.J. Park, Mark Pitak, Francine Rozanski, Jeff Schmidt, Judie Simpson, Carol Subick, Chad Stock, Chao-Ming Wang, Jeanette Walther, Gregory Wilken, and Katie Zimmerman. Additional thanks are expressed to University of Illinois faculty Sam Carpenter, Tom Chen, Mike Darter, and Ahmed Sameh.

Special thanks are due to the team at Intelligent Information Technologies (IIT) for system design and programming: Arthur Baskin, Bill Nelson, Mark Brown, and Robert Reinke.

Thanks to the Ohio Department of Transportation, Office of Aviation for allowing us to attach their Neil Armstrong and Mansfield databases as examples with the release of Micro PAVER 5.2.

Finally, and on behalf of the entire PAVER group, I would like express a special thanks in the memory of John MacMullen of APWA whose support, feedback, and encouragement will be greatly missed.

M. Y. Shahin  
Micro PAVER Principal Investigator  
U. S. Army Corps of Engineers  
ERDC-CERL

# Disclaimer

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# Table of Contents

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<b>Acknowledgments .....</b>	<b>4</b>
<b>Disclaimer .....</b>	<b>6</b>
<b>Table of Contents .....</b>	<b>7</b>
<b>Required/Recommended Hardware .....</b>	<b>13</b>
<b>Updating to Micro PAVER 5.2 .....</b>	<b>14</b>
<b>Micro PAVER 5.x Improvements.....</b>	<b>15</b>
<b>Overview .....</b>	<b>17</b>
Introduction to Micro PAVER .....	17
PAVER Organization .....	17
<b>Operating Features .....</b>	<b>19</b>
Basic PAVER Features .....	19
Spreadsheet Forms .....	19
Index Cards .....	20
Tab Tables .....	21
Printing Screen Images .....	22
Units of Measurement .....	22
Adjusting Table and Graph Sizes .....	22
EMS Tools in PAVER .....	23
Right Button Click on Tables .....	23
Right Button Click on Graphs .....	24
EMS Query Tool .....	24
Using the EMS Query Tool .....	24
Report Viewer - Summary and Detail Options .....	25
View Menu - Display Specific Report Information .....	26
Report Viewer Tables .....	26
Exiting the Report Viewer .....	27
<b>System Tables .....</b>	<b>29</b>
Define User Fields .....	29
NSORT - BSORT - SSORT .....	29
Additional User Fields .....	30
Customize NSort, BSort, SSort Headings .....	30
Inventory Pick Lists .....	31
M&R Plan Tables .....	31

Localized M&R .....	32
Global M&R .....	32
Major M&R .....	32
M&R Cost by Condition .....	33
Budgets .....	34
Condition Tools .....	35
Select Condition Types .....	35
Define Condition and Age Categories .....	35
Define User Distress Indices .....	35
Misc. Other Tables .....	35
Aircraft Type .....	35
Materials .....	36
Layer Construct .....	36
Unit of Measure (Field) Settings .....	36
<b>Database Tools .....</b>	<b>37</b>
Combine/Subset Database .....	37
Import / Export .....	38
5.2 Export Procedure .....	38
5.2 Import Procedure .....	39
Database Verification Tools .....	41
Copy and Move Data .....	42
Edit Image Paths .....	43
Edit Image Path Example .....	43
<b>GIS Tools.....</b>	<b>45</b>
GIS Assignment Tool .....	45
What is the GIS Assignment tool? .....	45
Using the GIS Assignment selection tool .....	45
GIS Assignment Tool Button Functions .....	46
PAVER Shape File Converter .....	49
Converting from PAVER 4.x to 5.2 .....	49
Shape File Conversion Procedure .....	49
Shape File Coordinate Shift .....	49
<b>Selectors .....</b>	<b>51</b>
Navigating the Pavement Inventory .....	51
The Tree Selector .....	51
The Tab Selector .....	52
The GIS Selector .....	52
The Tree and GIS Selector .....	53
<b>Inventory .....</b>	<b>55</b>
Definition .....	55
Managing Pavement Inventory - Basic Operations .....	55
Creating a Network .....	56
Creating Branches .....	57
Creating Sections .....	58
Conditions/Families .....	60
EMS Image Viewer .....	61



Store an Image .....	61
Viewing Images .....	62
Edit an Image .....	62
Other Image File Options .....	62
Additional Field Data (Traffic, Test, Work Data) .....	62
Work .....	62
Traffic .....	63
NDT and Test .....	63
<b>Inspection .....</b>	<b>65</b>
PCI and Distress Indices .....	65
Field Inspection - Basic Operations .....	65
Entering Inspection Dates and Samples .....	65
Entering Inspection Information .....	67
For Maximum Speed - Keyboard Only .....	68
Batch Inspection Data Entry .....	68
Calculating the PCI after Inspection .....	69
Other Conditions .....	69
Inspection Data Import (PAVER Database) .....	70
<b>Inspection Schedule .....</b>	<b>71</b>
Inspection Schedule Report .....	71
Open Saved Report .....	72
<b>Family Assignment .....</b>	<b>73</b>
Change Family Assignments .....	73
<b>Reports .....</b>	<b>75</b>
Summary Charts .....	75
Standard Reports .....	76
Re-Inspection Report .....	77
User-Defined Report .....	78
Create New Report .....	79
Edit Current Report .....	80
GIS Reports .....	80
Last PCI .....	80
General Info .....	81
<b>Prediction Model .....</b>	<b>83</b>
Create and Maintain Prediction Models .....	83
Building Family Models .....	83
Using the Prediction Model .....	83
Collect Model Data .....	84
Review Model Data .....	85
Use Boundary/Outlier .....	85
Options .....	86
View Equation and Stats .....	86
Assign Family .....	87
Other Condition Prediction Model Features .....	87
<b>Condition Analysis .....</b>	<b>89</b>
Condition Analysis Report .....	89

Overview .....	89
Configuring the Condition Analysis Report .....	89
Analyzing Pavements .....	90
Other Views .....	91
Open Saved Report .....	92
<b>M&amp;R .....</b>	<b>93</b>
M&R Plan .....	93
Configuring the M&R Report .....	93
Tab 1 - Scope .....	93
Tab 2 - Timing .....	94
Tab 3 - Plan Mode .....	94
Tab 4 - Policies and Costs .....	96
Analyzing M&R Activity .....	98
Summary View Section .....	98
Detail View Section .....	99
Open Saved Report .....	100
<b>Add-Ins .....</b>	<b>101</b>
Condition Data Import (ASCII) .....	101
Condition Data Import (Database) .....	102
Handheld Data Import .....	102
Micro PAVER Inspection Data Entry Using a Windows CE Handheld Device .....	102
Hardware/Software Requirements .....	102
Software Installation .....	102
Basic Software Operation .....	103
Process Overview .....	103
Detailed Process .....	104
Download Sections to Inspect .....	104
Inspections Using the Handheld PCI Inspector .....	105
Backup Inspection Data .....	106
Import Backup Data into PAVER .....	107
<b>Appendix A .....</b>	<b>108</b>
Inspection Information File Format (Standard and Extended Formats) .....	108
<b>Appendix B-1 .....</b>	<b>109</b>
Video Inspection Import Data Format (ASCII Text) .....	109
<b>Appendix B-2 .....</b>	<b>113</b>
Video Inspection Import Data Format (Access Database) .....	113
<b>Appendix C .....</b>	<b>114</b>
Abbreviations of Surface Types .....	114
<b>Appendix D .....</b>	<b>115</b>
Pavement Data Exchange (PDE) Format .....	115
<b>Appendix E .....</b>	<b>120</b>
Example Pavement Survey Forms .....	120
Concrete Surfaced Roads and Parking Lots .....	121
Asphalt Surfaced Roads and Parking Lots .....	122
Airfield Concrete Pavements .....	123
Airfield Asphalt Pavements .....	124

Unsurfaced Roads .....	125
Deduct Values .....	126
<b>Appendix F .....</b>	<b>127</b>
Load & Climate Distresses .....	127
Asphalt Surfaced Roads and Parking Lots .....	127
Concrete Surfaced Roads and Parking Lots .....	127
Asphalt Surfaced Airfields .....	128
Concrete Surfaced Airfields .....	129
Unsurfaced Roads .....	129
<b>Appendix G .....</b>	<b>130</b>
Micro PAVER Network Installation .....	130
<b>Appendix H .....</b>	<b>131</b>
Computing Work Quantity from Distress Quantity .....	131
<b>Glossary .....</b>	<b>135</b>
<b>Index.....</b>	<b>140</b>

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# Required/Recommended Hardware

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## **Required Hardware**

200MHz processor

32MB RAM

Microsoft Windows 95/98/2000 or Windows NT

130MB space needed for installation

## **Recommended Hardware**

Fastest processor available

256MB RAM

MS Windows 98

# Updating to Micro PAVER 5.2

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## Note

When converting from version 4.x to version 5.x, it is recommended to 1) Backup the database being imported, and 2) Run the verification tools on the imported database in version 5.x.

For Micro PAVER 4.x users, the conversion to Micro PAVER 5.2 is an easy procedure that can be split into a few simple tasks. These tasks include: importing e40 files into PAVER, updating GIS coverages created in PAVER 4.x, and updating some of the system tables in PAVER 5.2.

## Updating the Database

The first step is to import the databases created in PAVER 4.x into PAVER 5.2. This update is done using the same Import/Export tool that was featured in previous versions of PAVER. For information on how to import the e40 files see [5.2 Import Procedure](#) on page 39.

## Updating the GIS coverage

Converting PAVER 4.2 coverages to 5.2 is a simple two step process. The first step is to convert the coverage (\*.cov) file to a shape file (\*.shp) in ArcView. Once you have the shape file, you must use the **Shape File Converter** located under the **Add-Ins** menu in PAVER 5.2. For more information on the shape file conversion, see [PAVER Shape File Converter](#) and [Converting from 4.x to 5.2](#) on page 49.

## Updating System Tables

In the conversion process between PAVER 4.x and 5.2, some of the system tables in version 4.x do not import changes into PAVER 5.2. If changes or additions were made to the tables in version 4.x you must re-enter the values. The tables that do not import are: **Materials**, **Unit of Measure (Field) Settings**, and **Inventory Pick Lists**. These tables can all be found under the Tables menu in PAVER 5.2. It is recommended that you print out the tables in PAVER 4.x to make the data re-entry process faster. For more information about the [Inventory Pick List](#) see page 31, and for more information about the [Materials](#) and [Unit of Measure \(Field\) Settings](#) tables see page 36. All the information is located in the [System Tables](#) chapter, pages 29-36.

# Micro PAVER 5.x Improvements

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Micro PAVER 5 has numerous improvements over its predecessor. The first area of improvement is in the **System Tables**, which are used throughout Micro PAVER regardless of database. The second area of improvements is in the **Visual Menu** components, which, when used, are particular to specific databases. The following list outlines many of the important improvements made to the program.

## System Tables

**Define User Fields > Additional User Fields:** Allows the user to define user-specific fields.

**M&R Plan Tables > Major M&R > Tab 5:** This is a **Priority Table** that is a function of branch use and section rank. Branch use priority and section rank priority are defined by tabs 3 and 4, respectively.

## **Condition Tools >**

■ **Define Condition And Age Categories:** This allows the user to define ranges for conditions and ages to be used in all reports including summary charts and condition analysis.

■ **Select Condition Types:** The user selects conditions that will be shown throughout Paver, i.e. summary charts, condition analysis, etc.

■ **Define User Distress Indices:** The user defines any distress index for any selected groups of pavements. It is important to calculate the index for all sections--this can be a long process that may take up to an hour.

## Visual Menu

**Selectors:** Various selector functions are now available. The combination of **Tree** and **GIS** is used in the **Selection** button on the **PAVER Button Bar**. Making a selection using any of the tools is reflected throughout the system. The selection tools serve as a broadcast system.

**Inventory > Copy and Move Data:** Allows the user to move work history and inspection data among inventory items.

**Inventory > Definition > 3. Section Tab > Conditions/Families:** Allows user to view the condition and family assignment for any given section. This function is also available as a new tab on the Inventory\Sections tab.

**Reports:** There are two new options for reports.

- **Flexible Report:** Allows the user to select what columns are used in the report. Select **Create New Report** to select what columns are included in the report. To choose the columns, highlight the table from the tree with the desired columns. Then select the desired column from the left-hand-side window and move it to the right-hand-side window.
- **GIS Reports:** These provide inventory and PCI data reports.

**Condition Analysis > Condition Analysis Report:** Part of the output includes GIS views.

## **M&R >**

- **M&R Plan:** On the **Plan Mode** tab, the user selects either **Determine Budget Consequence** (identical to Micro PAVER 4.2) or **Determine Budget Requirements** (new feature).
  - The budget requirement feature allows the user to eliminate backlog in the number of years specified for the plan. The number of years is specified under the **Timing** tab. This is used by clicking the **Backlog elimination in X years** option.
  - The budget requirement feature can also determine the budget required to maintain the current PCI or achieve a desirable PCI in the number of years for the plan. This is used by clicking the **Condition Stabilization** option.
- **Policies and Costs**
  - The user can apply localized policies in the first year as in Micro PAVER 4.2
  - Or you can simply use M&R cost by condition for all years (new). The user may select the major M&R start year and when the user selects a date for major M&R later than the plan start year, you can also select to show the backlog during the time as well. This feature is useful in determining the consequence of no major M&R for a specified time period.

There are also many reporting improvements located throughout the system. Some final things to note: For added convenience, Micro PAVER 5 allows the docking of windows. This is accomplished by right clicking the diamond icon on the window desired to be docked. Another added feature is on the **PCI Inspection** form. When you right click on a distress, the distress manual and a description of the distress along with images appear.



# Overview

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## Introduction to Micro PAVER

**Micro PAVER 5.2 for Windows** (herein referred to as PAVER) is an automated pavement management system (PMS). It is a decision making *tool* for the development of cost effective maintenance and repair alternatives for roads and streets, parking lots, and airfields. PAVER provides you with many important capabilities, including:

- Pavement network inventory
- Pavement condition rating
- Development of pavement condition deterioration models (Family Curves)
- Determination of present and future pavement condition (Condition Analysis)
- Determination of maintenance and repair (M&R) needs and analyzing the consequence of different budget scenarios (Work Planning)

---

## PAVER Organization

**Note**

The nine buttons on the **PAVER Button Bar** are arranged to reflect the logical sequence of pavement management.

The main features of PAVER are accessible from nine buttons arrayed across the top of the **PAVER Desktop**. The buttons have been arranged to reflect the logical sequence of pavement management. They initiate the most frequently used features in PAVER. Additional features are accessed through the **Visual Menu**.

This button array is referred to as the **PAVER Button Bar**. By clicking one of the buttons, you launch one of ten principal PAVER components. These components are:

<b>Inventory Data (Inventory)</b>	Inventory data entry and summary charts
<b>Work Information (Work)</b>	Work required and work history
<b>PCI Inspections (PCI)</b>	Field inspection data entry
<b>Reports</b>	PAVER reports and summary charts
<b>Prediction Models (Pred. Modeling)</b>	Build and assign condition prediction models



# Operating Features

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## Basic PAVER Features

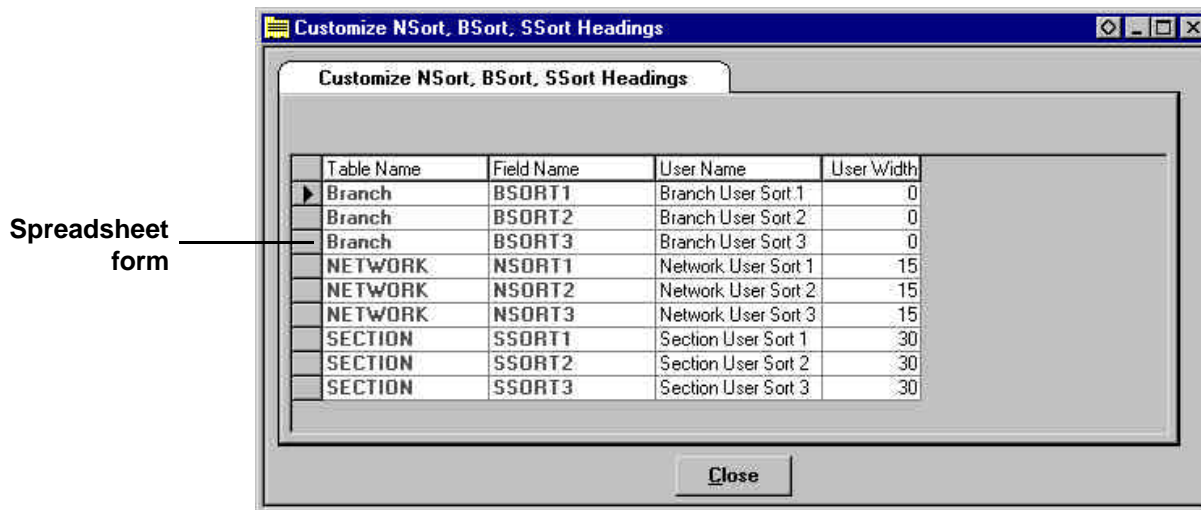
PAVER introduces several new **Engineered Management System (EMS)** tools: **EMS Query, Report Viewer, Right Button Click on Tables, and Right Button Click on Graphs.** The PAVER program is designed using commercial Windows components and the user interface follows standard Windows protocols. Familiarity with basic Windows user skills is assumed in the design of the program, the preparation of program documentation, and the design of the help system.

Several specialized custom tools are featured in PAVER. These tools are Windows consistent and after a brief introduction, will enhance your use of PAVER. These tools are also being made available to developers of other EMSs. Consequently, the features you learn to use in PAVER will be of use in other EMS systems.

### Spreadsheet Forms

The basic form for editing and viewing data in PAVER is a table that operates like a spreadsheet. In some instances, these forms are used only to present data and the values displayed cannot be edited. On other occasions, you are able to edit the data or add new lines to the table.

As with other tools, highlighting the spreadsheet and right clicking invokes a menu of spreadsheet tools. Depending on the context, some of the right button click features may not be available. Inactive features are listed in the menu as light gray, while active features have a darker color. The basic right button click spreadsheet features allow table zoom, table layout customizing, add/edit/delete record, search, import/export, print table, and graph options.



## Index Cards

Index-style data entry windows are used in several forms by PAVER: **Inventory**, **Prediction Modeling**, **Condition Analysis**, **M&R Planning**, and **EMS Query**. The index-style windows place data entry fields on multiple forms that look and operate like paper index cards. Therefore, if the PAVER form you are using has an index card style interface, you may switch between multiple cards without opening or closing additional windows.

When a window containing index-style data cards first opens, one of the form's index cards is the initial active card. Each index card form includes a tab with a descriptive title. When the index card is active, the contents of the card are visible and can be edited. Only the tab portion of non-selected index cards is visible. Typically, the selected index card and its table is highlighted with a brighter background color. The non-selected index card tabs are darker. Colors vary depending on the Windows color scheme you have selected.

### Note

Changes made on the index data cards are made real-time. PAVER automatically saves any changes the user makes.

To change the active index card, use the mouse to point to an inactive index card title and left click. The selected card becomes the active card and the previously active card becomes inactive. You can now edit or add entries to the fields on the active index card. After editing is complete, click the close button on the form or use the Windows close form menu. Your data is saved to the database in real time as you make your edits. This means there is no action required to save your changes.

Click on tab for access to card

Edit fields on active card

00001-IFARB-01

1. Network    2. Branch    3. Section

Properties    Conditions / Families

Section ID: 01    From: NEWTON DRIVE    To: INTERSTATE DRIVE

Surface Type: AAC    Rank: T    Last Constr. Date: 3/1/1990

Length: 1,387    Width: 30.    Ft

Calc. Area: 41,610.    Area Adjustment: 0.    SqFt    True Area: 41,610.    SqFt

Category: N    Zone:    Lanes/ Spaces: 0

Shoulder:    Street Type:    Grade: 0

Comment:

User Defined Fields:

Intersection Type	Sweep Schd	Snow Plow

Images (0)    New    Copy    Delete    ☒ Track Selections    Close    Help

## Tab Tables

**PAVER Tab (tabular) Tables** are spreadsheet-like tables used in PAVER to display and edit system configuration information. The **Tab Tables** are accessed from the **Tables** menu option. **Tab Tables** look and operate like spreadsheets. Right button click features are used to print, zoom and configure the tables. Buttons on the bottom of the tab form are used to add and delete records.

There are two types of **Tab Tables**, basic (**Independent**) and linked (**Dependent**). The basic table operates like a standard spreadsheet except that data input into the table is controlled by the series of buttons (**Close, Add and Delete**) that are arrayed along the bottom of the **Tab Table** forms. Clicking the **Add** button inserts a new record into the table, which can then be edited. The **Delete** button is used to remove the highlighted record in the table. The mouse or arrow keys are used to move up and down the rows and across columns in the active **Tab Table**. The active record in the table can be edited. The **Close** button is used to close the **Tab Table**.

The second type of **Tab Table** is a linked table. The linked table uses the records of a basic table or tables as the basis for its data entry. The linked table is referred to as the child, or dependent table, and the basic table is the parent (**Independent**) table. For example, the work type cost table uses three work type tables: localized, global and major as the basis for its entries. Therefore, when you add a record to the work type cost table (a linked table), you click the **Add** button and get a pick list of possible values to add. The table is formed from the entries in the linked table's parent table(s) (localized, global, and major M&R tables in this case).

Linked tables help PAVER enforce consistency in its data tables. For example, if the work type cost table was not linked to the M&R tables it, would be possible to develop costs for M&R procedures that were not even defined. This type of inconsistency, if it occurred, can damage the accuracy of analysis routines like the **Work Plan**.

## Printing Screen Images

Printing in PAVER is accomplished in one of three ways. First, the standard PAVER reports include specialized forms for printing reports (see the **Standard Reports** section). The PAVER right button click on tables or graphs tool provides a method of printing tables or graphs. In certain situations, you may wish to print the contents of a screen as it appears, which can include multiple tables, graphs or other data entry forms. To print the image on your screen, select **File** from the PAVER Menu and then **Print** from the **File** sub-menu. In some instances you will note that the **Print** option is not available to select from the **File** sub-menu. This means that there is currently no printable object on the PAVER Desktop.

After selecting **Print**, the print dialog box appears on your screen. The form contains a drop list labeled **Print What**. Open the drop list and select **Form Image**. Click the **OK** button to send a print of the active PAVER window to the printer. You may use the **Printer Setup** dialog window to select an alternate printer if you have access to multiple printers. After you have printed the form image, the print dialog window closes and you return to the PAVER window that was active when you selected the **Print** option.

### Note

Each time that you wish to print a graph in color, you must select color using the **System** button on the graph **Toolbar**.

Graphs in PAVER can be printed in either black and white or color. The default setting in PAVER is black and white printing for graphs. To choose color printing, right button click on the graph and select **Toolbar**. On the toolbar click the **System** button. Under **Printing**, change the selection from **Mono** to **Color** and click OK.

## Units of Measurement

To change units from English to metric, go to the **Preferences** selection on the PAVER Menu located above the **PAVER Button Bar**. Click once on **Preferences** and then select **Metric Units** from the **Preferences** sub-menu. Rounding error is not introduced into stored data values if repeated changes between English and metric units occur, because all measurement values in PAVER are stored as metric values. Changing the setting in **Preferences** changes the filters that are used for presenting data on PAVER screens and reports. To ensure that the display properly reflects the unit change, it is best to close all data entry and report screens before switching preferences.

## Adjusting Table and Graph Sizes

Tables and graphs automatically re-size to the available space on your computer display. As the number of active tables increases, the number of lines allocated to each table reduces. If a table is associated with a graph, the table and the graph share the horizontal space that is allocated to the table. You can adjust the space allocated between a table and its associated graph by pointing to the vertical bar that separates a table from its graph and then, while pressing the left mouse button, drag the separator bar to the right or left. You cannot manually increase or reduce the vertical space allocated to a table in the **Report Viewer**. If you want to increase the vertical space available for a table you must close one of the other **Report Viewer** tables. You may use the zoom function on active tables with the right button click tool for a temporary larger presentation of a table or a graph.

# EMS Tools in PAVER

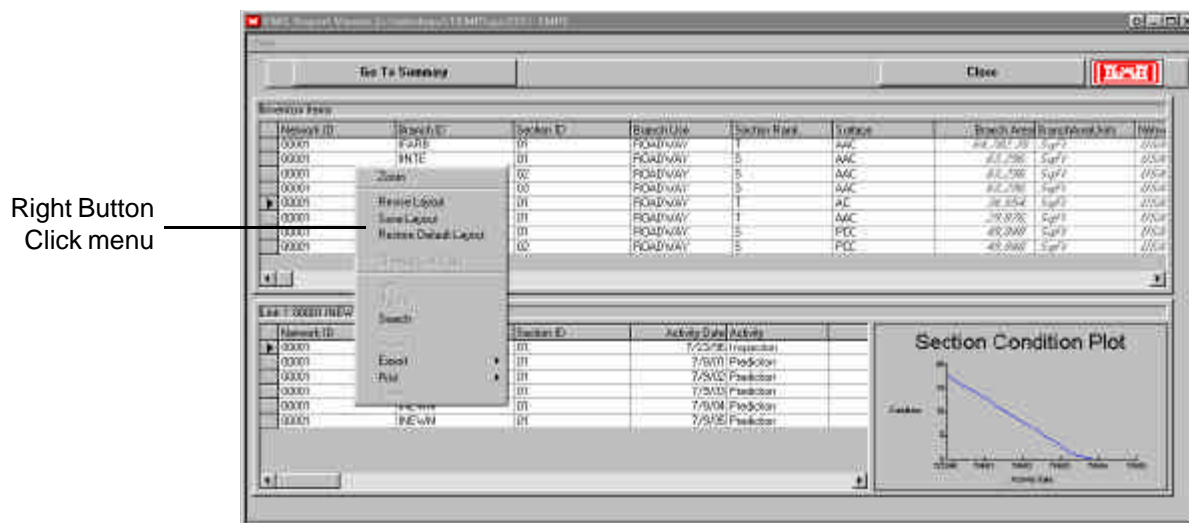
## Right Button Click on Tables

Whenever possible, information in PAVER is presented in tables. These tables are used to input, edit, and review reports (**EMS Report Viewer** and **Reports**). The tables in PAVER are equipped with several features that enhance the capabilities of the PAVER system. These features include:

- Table printing
- Exporting the table to Excel
- Changing the formatting of the table
- Zooming on the table
- Adding or removing fields
- Sorting the table

To access the extended table features you must first make the spreadsheet table active, by clicking on the table. Once the table is active and the mouse pointer is over any portion of the table, right click to invoke the menu of extended table features. Select items from the right button click menu by pointing to the menu item and left clicking.

In addition to the right button click table features, column widths can be reduced or enlarged when a table is active. To change column width, point to the vertical line positioned between the columns. When the mouse pointing indicator changes from the large arrow to the small double arrow icon, click and drag the column border to the desired size.



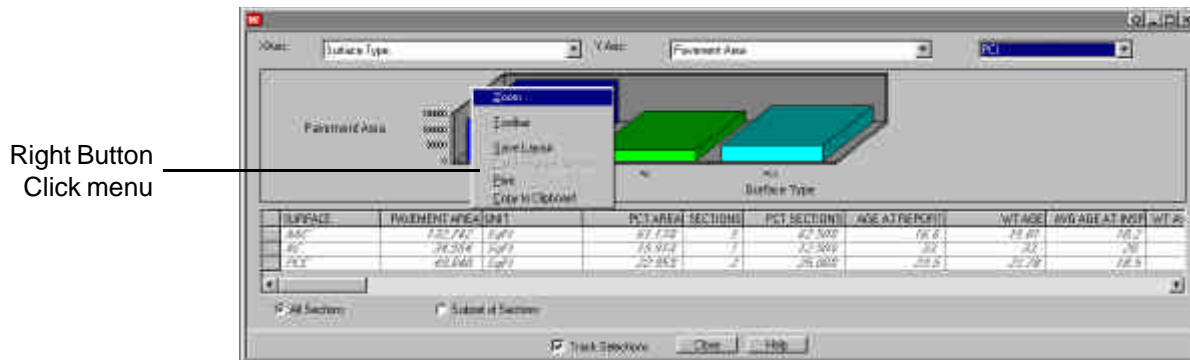


## Right Button Click on Graphs

PAVER graphs can be printed, customized and zoomed in the same manner as PAVER tables. To view a PAVER graph, make the graph active by clicking on the graph. While the graph is active and the mouse pointer is anywhere on the graph right click to invoke the graph menu. Select items from the graph feature menu which is accessible with a right button click.

You can customize the look of PAVER graphs on the fly by using the EMS right button click tools. The graph **Zoom** feature enlarges the graph to the full extent of the window in which the graph is located. From the zoomed graph window, you can copy the graph to the clipboard to later paste into spreadsheets, presentation programs or other Windows applications. To return to the original window, right click on the zoomed graph and select **Unzoom**.

**Toolbar** invokes a graph editor (**Graph Control**) that allows you to customize graph type and presentation. For example, you may change the graph type from a two dimensional bar graph to a three-dimensional pie chart. The **Save Layout** feature saves the current graph configuration so that on subsequent visits to the current graph it will retain the graph properties you specify using the **Toolbar**. The final graph feature, **Print**, allows you to print your graph to a Windows printer.



## EMS Query Tool

The **EMS Query Tool** is used in several places in PAVER to select a subset of pavement sections to use in reports and data modeling. The query tool can also be used to specify the sorting order of data. Selection and sorting criteria specifications can be stored and retrieved by name in the **Stored Criteria** box. The query tool also reports the record count (number of sections selected), as filtering queries are built.

## Using the EMS Query Tool

Filter criteria are entered using the drop boxes arrayed across the query form. Fields are entered from left to right and top to bottom. As you enter query information, only the next field will be highlighted for user selection. For example, use the first entry in the **Field** column to select Surface. Once you have selected **Surface**, the **Comparison** field is highlighted. After selecting a query field and the comparison evaluator ( $=$ ,  $>$ ,  $<$ ,  $>=$ ,  $<=$ ,  $<>$ ), the **Compare To** field becomes active. The drop list on the **Compare To** field lists the available choices in the database for the selection you made in the **Field** column.



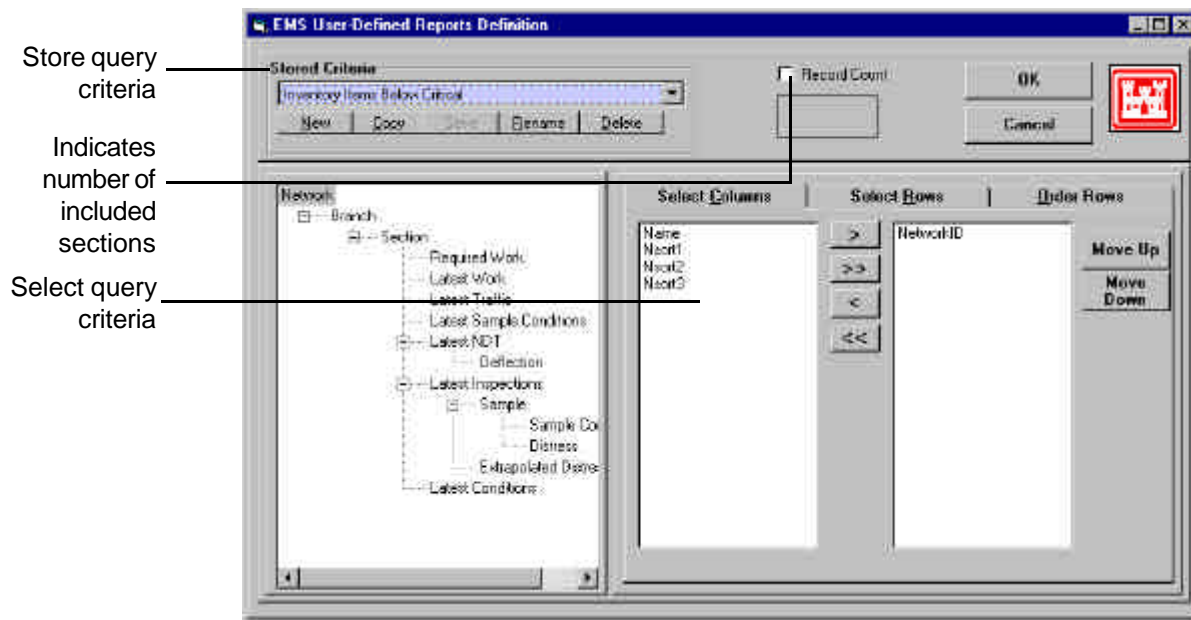
### Note

Clicking the **Record Count** checkbox shows real time updates of how many pavement sections are currently selected by the query tool.

After you make a selection in the **Compare To** field, the record count indicator will change as the query you are building is applied to the database in real time.

The first column on the query form contains the query statement operators (**And, Or**). These operators are used to join the individual query statements. To see the **Structured Query Language (SQL)** query that you have built with the query tool, click the **View Text** button at the bottom of the screen. The **Clear All** button removes all selection criteria on the screen. Click the **Save** button on the **EMS Query Tool** to save a set of report criteria.

The **AND/OR** operators require some additional clarification. For example, if the user wants to include pavement sections constructed with asphalt and concrete then the correct operator is **OR**. The query will return any sections that fit either of the conditions. However, the **AND** operator only returns sections that fit all of the listed conditions. For example, selecting asphalt surfaces and branch use equal to parking lots with the **AND** operator returns only asphalt parking lots. Using **AND** with the first example will return nothing, since it is impossible for a section to be both asphalt and concrete surfaced.



## Report Viewer - Summary and Detail Options

The PAVER analysis reports: **Condition Analysis Report**, and the **M&R Report** are presented in the **EMS Report Viewer**. The **EMS Report Viewer** is a tool that provides a framework for displaying multiple spreadsheet-like tables that contain report information. The spreadsheets in the **Report Viewer** can be associated with graphs that operate in conjunction with the spreadsheet tables. The **Report Viewer** organizes the presentation of report results in two basic views, the summary view and the detail view. The summary view includes high level views of summarized report data. The detail version of the report includes section by section details that are covered in the summary version of the reports. To switch from between the Summary and Detail views, click on the **Go to Detail/Summary** button.

### Note

When selecting and deselecting several different report views, **AutoRefresh** can be deselected so that PAVER won't redraw the graphs until the user re-selects the option.

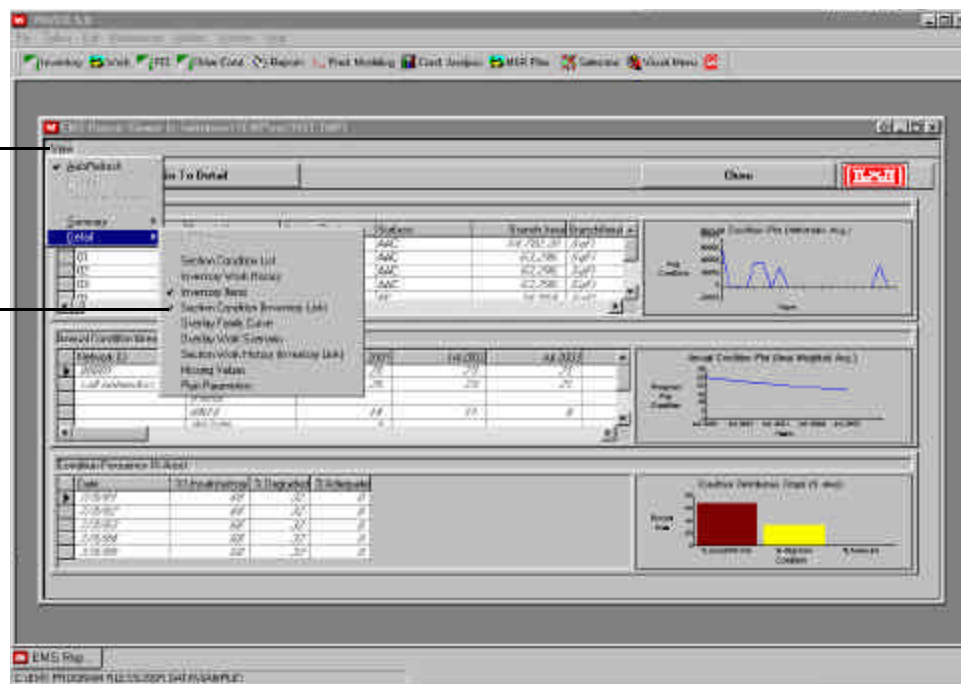
## View Menu - Display Specific Report Information

The **Report Viewer** includes a **View** option that is used to open and close the various spreadsheet views of the report data. You may use the **View** in the **Report Viewer** window to configure the report viewer so that it presents only the information you wish to view. The default presentation of the **Report Viewer** is the summary version. To turn off one of the summary tables (and its associated graph), select **View** from the **Report Viewer** window, **Summary** from the **View** sub-menu and then select the table which you want to turn off. Tables or graphs which are active in the current report view have a check mark to the left of the table or graph name.

Under the **Detail** sub-menu, **Plan Parameters** opens a table displaying the parameters that were used to configure the current report. This is convenient for checking the settings you requested when you ran the report without having to leave and rerun the report.

View Menu

Select tables and graphs to display



### Note

Although the **View** button appears grey, it is always active.

## Report Viewer Tables

The spreadsheet tables in the report viewer are standard PAVER tables and support the right button click on tables features. When an **EMS Report Viewer** report (I.E. **Condition Analysis** or **M&R Work Plan**) is displayed the tables are made active with a left click.

Spreadsheets in the **Report Viewer** can be associated with graphs. These graphs are implemented in two different ways. The first type associates a graph directly with a single row, the active or highlighted row, of the table. In this case, as the user changes the active row in the spreadsheet, the graph dynamically adjusts so that the graph reflects the active row in the spreadsheet.

The second type of graph association is as an overlay on an existing graph. For example, in the **Condition Analysis Report**, a table showing combined section condition history and projections is linked to a graph that plots the condition over time. This graph can further be overlaid with a plot of the family curve assigned to the section. As elsewhere in the program, graphs in the **Report Viewer** can be zoomed, printed or configured with the right button click on graphs feature.

## Exiting the Report Viewer

When you have completed reviewing a **Report Viewer** report, close the report by closing the **Report Viewer** window. Click on the **Close** button in the top right corner of the **Report Viewer** window. Windows users may also use the mouse to select the close Window symbol (X) located in the upper right corner of the window.

After you close a report, you are prompted to save the report. If you choose to save the report, a file dialog box window is presented so that you can name the report to be saved. *Note: Each report type has its own unique file extension: Condition analysis reports are .rpc files and M&R Work Planning reports have .rpw extensions. These extensions should be maintained when you name a report file.*

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# System Tables

## Define User Fields

The PAVER system is designed so that you may assign user defined fields to each level of the inventory (network, branch, and section.) The advantage of this capability is that PAVER allows you to sort the database at any level according to criteria that you have defined. This is helpful if you want to select certain networks, branches, or sections for reports or work plans. There are two types of user defined fields. **SORT** fields are designed to be pick list fields, requiring you to select among a predefined set of choices. **Additional User Fields** require the user to enter data.

### NSORT - BSORT - SSORT

#### Note

To change the default name given on a **SORT** tab, see **Customize NSort, BSort, SSort Headings**.

At each level of the Inventory hierarchy (network, branch, and section), PAVER allows you to create three **SORT**s. Under the main menu, select **Tables...Define User Fields...SORT** for the desired level of inventory. Enter data by clicking on the field you wish to edit. The entries for **Name** should be short and easily recognizable since these will be displayed in PAVER as the options presented in the picklist for the **SORT** field. The **Description** entry should indicate the complete name. Click **Add** to add more entries for the sort, and click **Delete** to delete the selected entry. The selected entry is indicated by an arrow in the left margin. To assign criteria for the other two **SORT**s, click on their corresponding tabs.

Sample entries for  
SSORT by intersec-  
tion type

Name	Description
2 Way Stop	Intersection
3 Way	Intersection with 3
4 Way Stop	Intersection with 4
Caution	Intersection with
Trf Light	Traffic Signals
Yield	Yield at Intersection
*	

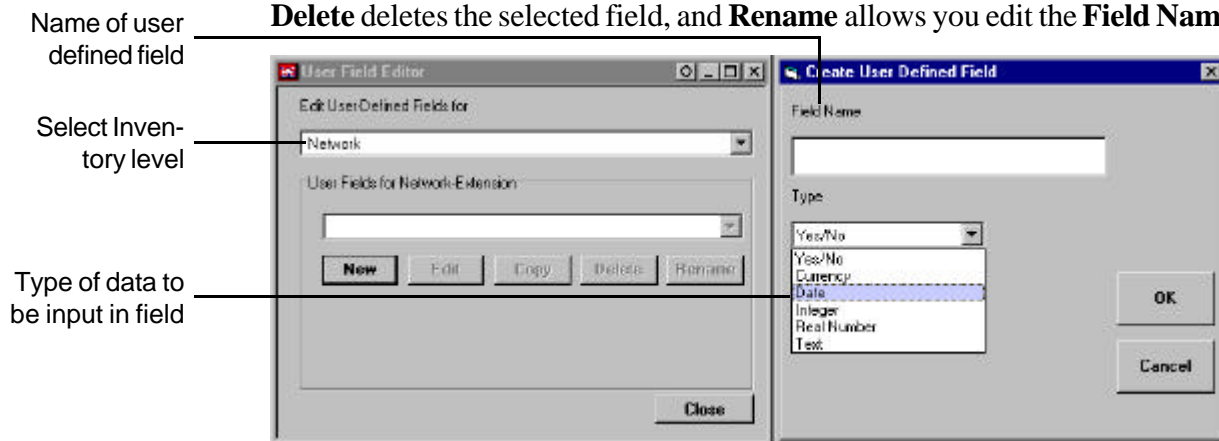
## Additional User Fields

This section allows you to create user-defined fields in which you may enter data. From the PAVER main menu, select **Tables...Define User Fields...Additional User Fields**. To create a new field, first select the desired inventory level and click on **New**. A second window appears. You need to supply the following information:

- **Field Name** - The entry for this is displayed as the **Additional User Field** name when using this capability in PAVER.

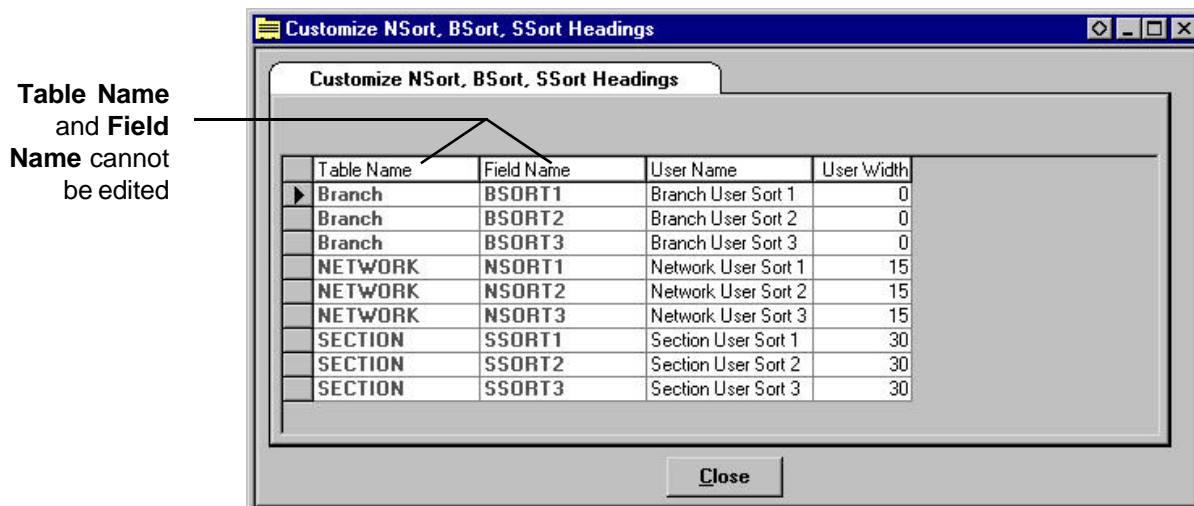
- **Type** - Designate what kind of data is to be put into the field: Yes/No, Currency, Date, Integer, Text, etc. When you use the **Additional User Field** in PAVER, you are only able to enter data of the **Type** you specify.

To edit the **Type** of an already existing entry, select it from the list of **User Fields** and click on **Edit**. To copy the field, click on **Copy** and assign a new name for the field. **Delete** deletes the selected field, and **Rename** allows you edit the **Field Name**.



## Customize NSort, BSort, SSort Headings

This window allows you to set the values for the **User Name** (the name displayed in PAVER) and the **User Width** (the size of the field) for selected preset fields in PAVER. The first two fields, **Table Name** and **Field Name**, are displayed in italics and cannot be edited.



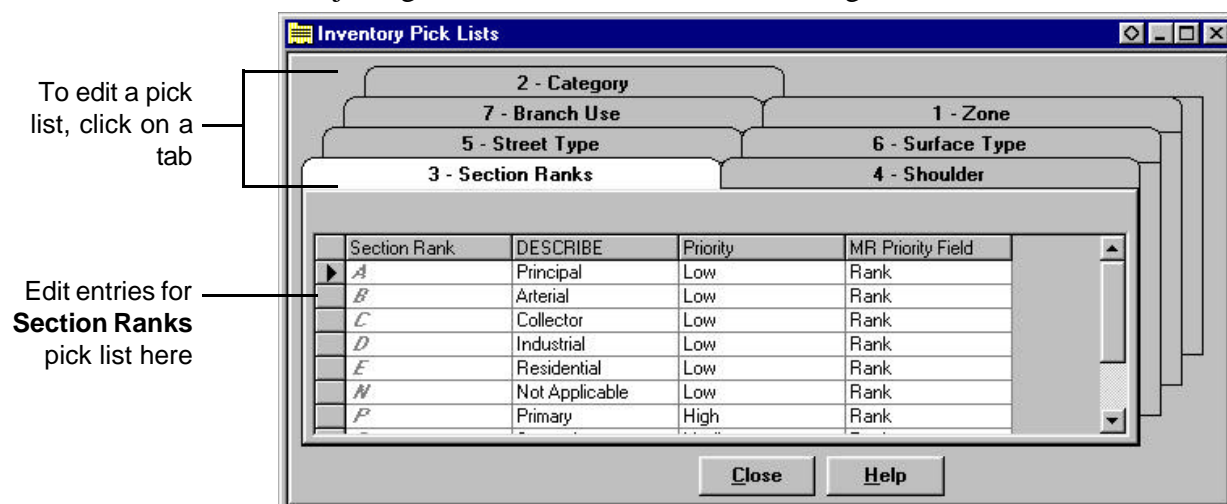
# Inventory Pick Lists

## Note

On the **Section Ranks** tab, you are not able to add entries or edit the already existing section rank names.

This window displays seven tabs that provide editing access to a group of "pick lists" within PAVER. All of these tabs allow you to add items to the current list. In some cases, existing table data is considered to be default and cannot be deleted. In most areas, PAVER will direct the process of data input to conform to the necessary PAVER database formatting. Some fields allow you to enter any text value, while other fields produce a prompt to the user to select an option from a list that is displayed. Examples of using this window are:

- Customizing **Zone** names
- Naming a new **Surface Type**
- Adjusting M&R Priorities for different Rankings.



Clicking **Add** adds a new record to the table. Before clicking **Delete**, first highlight the desired record by clicking on the box at the left of the record. PAVER asks you to confirm every Delete action.

## M&R Plan Tables

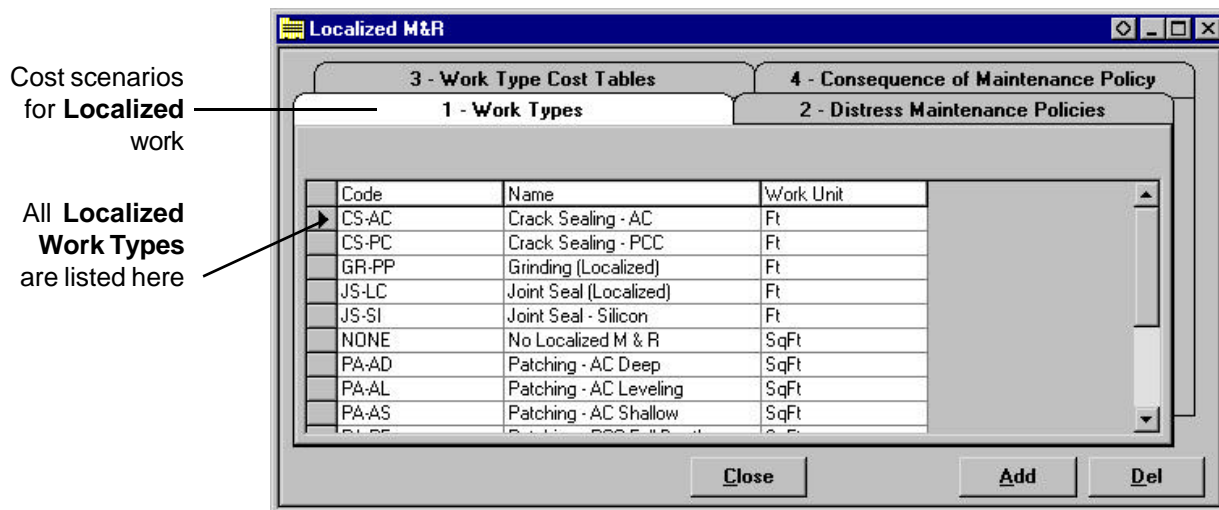
All tables found under this category are tables that PAVER uses when executing the M&R plan. Like previous tables, most of these tables allow you to add items and delete non-default items. To edit a cell in the table, click on the cell you wish to edit and enter the new value. Once changes are made, they are automatically saved to the system. A brief description of each table follows.

### Note

For more information on **M&R Work Plan** execution, see page 85.

## Localized M&R

- **Work Types:** A listing of all work types classified as localized repairs.
- **Distress Maintenance Policies:** You can define separate tables and group different localized work types for different maintenance scenarios.
- **Work Type Cost Tables:** You can create different cost tables to correspond with different jobs or regions. There must be a cost entered for all work types listed.
- **Consequence of Maintenance Policy:** For every work type listed in the localized category, there is an associated table here. Each table consists of a list of all distresses related to this work type and the resulting distress produced as a result of performing this type of work. This assists the **Work Plan** in predicting future PCI's.



## Global M&R

- **Work Types:** This is a listing of all work types considered Global. This includes M&R work applied over a larger area of pavement. Other data included in this table is the **Application Interval** that work would be reapplied and the **Delta Age**, or change in age, of the pavement. This "Delta" is defined as the time (in years) it would take for the condition of the pavement to return to where it was prior to application of the global treatment. Again, the M&R Plan uses these numbers when predicting condition.
- **Cost:** This is similar to **Localized**. The user can create different cost tables depending on the scenario.

## Major M&R

- **Work Types:** All work types considered to be major are listed here.
- **Work Type Cost Tables:** All costs associated with **Major M&R** work types are listed here.
- **Branch Use Priority:** The user has the ability to assign a priority to pavements based on their declared usage. This priority is considered during M&R Plan execution and determines how limited funds are spent.



- **Section Rank Priority:** The user may assign a priority to pavements based on section rank.

- **Priority Table:** This is a priority matrix based on Branch Use Priority and Section Ranking. The lower the number, the higher the priority.

- **Minimum Condition:** This table allows the user to set the **Minimum Condition** or critical PCI. A critical PCI (or **Minimum Condition**) is set for the combination of each **Branch Use**, **Section Rank**, and **Year** combination.

Select priority for **Major M&R** for each **Branch Use**

The screenshot shows a software window titled "Major M&R". It contains two main sections: "3 - Priority Table" and "4 - Minimum Condition". Under "3 - Priority Table", there are two sub-sections: "1 - Branch Use Priority" and "2 - Section Rank Priority". The "1 - Branch Use Priority" section contains a table with the following data:

Branch Use	Use Description	Use Category	Major M&R Priority
APRON	APRON	Airfield	Low
HELIPAD	HELIPAD	Airfield	Medium
MTRPOOL	MTRPOOL	Roadway / Parking	Medium
OTHER	OTHER	Roadway / Parking	Medium
PARKING	PARKING	Roadway / Parking	Low
ROADWAY	ROADWAY	Roadway / Parking	High
ROUND	ROUND	Roadway / Parking	Medium
RUNWAY	RUNWAY	Airfield	High
STORAGE	STORAGE	Roadway / Parking	Low

At the bottom of the window, there are three buttons: "Close", "Add", and "Del".

## M&R Cost by Condition

This window allows the user to create cost tables for different scenarios. Costs are grouped into four categories:

- **Local:** These costs refer to localized repair work triggered in the M&R Plan in the "Policy > Critical" section.

- **Stop Gap M&R:** These are localized repair costs triggered in the "Policy < Critical"

- **M&R Airfields:** This is a cost list of major M&R work done on all pavements that fall into the "Airfields" category.

- **M&R Roadways:** These are costs associated with major work done on all pavements classified as "non-airfield", such as roads, parking lots, etc.

For the above cost tables, the costs are for doing work "by condition". Enter an estimate on the pavements based on a range of conditions from 0 to 100 by increments of 10. The unit cost to perform work are generally less for a pavement with a better condition. However, you can create tables and customize them in a way that reflects the actual cost of doing work. The **M&R Plan** uses these figures to calculate budgets for all years beyond the first. Click on **New Table** and enter a name for your cost by condition scenario. Click on any cell you wish to edit and type in the new value.

Cost per square foot for major M&R done on roadways with PCI of 0 to 9

**M&R Cost By Condition**

Name: Default Cost by PCI Range

Cost Category	Units	0	10	20
Local	SqFt	\$0.75	\$0.56	\$0.39
M&R Airfields	SqFt	\$3.33	\$3.33	\$3.33
<b>M&amp;R Roadways</b>	SqFt	\$2.50	\$2.50	\$2.50
Stop Gap M&R	SqFt	\$0.15	\$0.10	\$0.07

New Table Rename Del Table Close Help

### Hint

You can create a budget of \$10,000/Year and use the Budget multiplier feature in the **M&R Work Plan**.

## Budgets

Here, you can create tables to specify a budget for each year. When running the **Work Plan**, you can select from a list of budgets. To create your own budget, click on **New Table**. You are given the option of copying the budget that is displayed. When creating a new table, select the copy option to save time entering data if most values are the same. Enter **Year** and budget **Amount** information. By placing actual budget numbers in a budget table, you can restrict the spending of the work plan to a specific budget. Creating different budget tables also allows you to compare the results of different **Work Plan** scenarios.

All budgets in your system are listed here

Enter a budget amount for each year

**Budgets**

Funds By Year

Name: 100K per Year

Year	Amount
1/1/1996	\$100,000.00
1/1/1997	\$100,000.00
1/1/1998	\$100,000.00
1/1/1999	\$100,000.00
1/1/2000	\$100,000.00
1/1/2001	\$100,000.00
<b>1/1/2002</b>	\$100,000.00
1/1/2003	\$100,000.00
1/1/2004	\$100,000.00
1/1/2005	\$100,000.00

New Table Rename Del Table Close Help Add Del

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# Condition Tools

## Select Condition Types

To make condition types available for use in PAVER, they must be declared in this window. Condition types will be classified as **Numeric** or **Textual**. You may declare **Minimum** and **Maximum Values** for **Numeric Condition Types**. To make a condition available for use in PAVER choose "yes" in the **Selected** column. If you would like to keep the condition data in the table for future use but do not wish to make it accessible, a "no" in the **Selected** field hides the condition from the program.

## Define Condition and Age Categories

The user may establish a set of categories for each condition available in PAVER. The table for each set of condition categories consists of a name for the category (i.e. "Good", "Poor", etc), a high and low value to establish the range for the category, and associated colors for each category to be used in the graph and GIS text. The **Age Categories** tab is simply a table of age brackets by which you can group pavements. These tables are used in the graphical display of condition information throughout PAVER.

## Define User Distress Indices

**New**

You may now create your own condition index based on your selection of distresses.

You have the option to create a user defined index. These indices are computed with the same engine that PAVER uses to calculate the PCI, so the index is a customized PCI. After naming the index, select every distress and severity level that is to be included in the computation. At this point, PAVER then uses deduct values from only the specific distresses indicated. Other distresses are ignored for this index. After naming the index and selecting the applicable distresses, this distress appears on the **Numeric Condition Types** tab of the **Condition Type Selection** table. The only way to delete the newly created index is to return to the **User Defined Distress Indices** table.

---

# Misc. Other Tables

There are four tables here that allow you to enter specific information into PAVER:

## Aircraft Type

This table holds information on a variety of aircraft and will be used in later versions of PAVER to catalog airfield traffic and its effect on pavement condition.

## Materials

This table is a list of all material types, with **Item** number and **Description**, that are available for selection within PAVER. These are used in the **Work** section of PAVER, where you can list the specifics of work that has been performed, including the type of material used. You can add any material types to this list by entering an **Item** and **Description**.

## Layer Construct

This table contains information on different work types associated with base preparation. In order to enter a line item of work specifically for base course, establish the work type in the **Layer Construct** table. The information on these lists is accessible from **Work**, under the **History** tab.

## Unit of Measure (Field) Settings

Here, select a particular unit from a pick list to be associated with measurements used within PAVER.

# Database Tools

## Combine/Subset Database

The **Combine/Subset** option enables you to combine multiple databases or portions of them into a single database or to separate a database into different parts based on user preferences. The **Combine** option is also useful for making a copy of a database to protect an original.

### Note

It is recommended that you utilize a scratch file (a temporary working file) as the destination for all **Combine/Subset** operations.

The **Combine/Subset** form has four components: source file selection, destination file specification, selection criteria and processing status. Click the **Select** button associated with the large file selection list window labeled **Source** to identify the file(s) to be combined, split, or copied. To combine databases you need to select two or more files. Select only one file if you are subsetting or copying a file. Specify the target for the combined or subset database by clicking the **Select** button associated with the window labeled **Destination**. Enter a new file name for the database that you are creating.

The **Selection Criteria** button invokes the **EMS Query Tool** to filter the source databases. For example, you can combine several databases choosing to select only those sections from the source databases that have surface type equal to AC and rank equal to P (primary). Note that the selection criteria you specify depends on the values in the first source database you select for the combine operation. For example, if the first database you select has no AC pavements, the **EMS Query Tool** can not be set to select AC as the filter for surface type.

The screenshot shows the 'Combine / Subset PAVEMENT Database' dialog box. It has a title bar with a standard Windows icon and window controls. The main area is divided into several sections. At the top, there is a 'Source:' label followed by a large empty text box and a 'Select' button. Below this is a 'Destination:' label followed by a smaller empty text box and another 'Select' button. Underneath the destination section is a 'Selection Criteria' button and an empty text box. The bottom section is titled 'Processing Status:' and contains three labels: 'File:', 'Table:', and 'Status:', each followed by an empty text box. To the right of these labels is a large empty rectangular area. At the very bottom of the dialog are two buttons: 'Execute' on the left and 'Exit' on the right. Three lines with text labels point to specific parts of the dialog: 'Select source database(s)' points to the 'Source' text box; 'Select a file name for the new database' points to the 'Destination' text box; and 'Run Combine/Subset procedure' points to the 'Execute' button.

Select source database(s)

Select a file name for the new database

Run **Combine/Subset** procedure

The **Execute** button launches the **Combine/Subset** operation. The processing status area of the screen monitors the progress of your operation and posts the results. Once the operation is complete, click **Exit** to close the **Combine/Subset** form and return to the PAVER desktop. Use the **File/Open** option from the PAVER Menu to select the newly combined, subset, or copied database.

---

## Import / Export

### Note

PAVER 5.1 **Import** also imports export files created by 4.x versions of PAVER (e40 files).

The **Import/Export** utilities are used to exchange data between different computers running PAVER version 5.2. The database sender uses PAVER **5.2 Export** to create a single file with the extension “e50” - to signify "export, version 5.0" that can be brought into another PAVER system using PAVER **5.2 Import**. The receiver uses PAVER **5.2 Import** to transform a single file (with the extension “e50”) prepared with the PAVER **5.2 Export** program, to a working pavement database in their PAVER system. This e50 file is a compilation of three separate files required to open a PAVER database. Once in the system of the receiver, the database can be opened.

### 5.2 Export Procedure

The **5.2 Export** window is divided into three sections: **Options**, **File Selection**, and **Working Status**. Export files can contain different combinations of pavement data and common data. Pavement data is accessed from the **Inventory**, **Field Inspection** and **Field Data** areas of the PAVER program. Common data is accessed from the **Tables** menu. The contents of the Export file are determined by the selection of one of three options that are located at the top of the Export form. A description of each **Export Option** follows.

- **Export pavement database and associated family** - This creates an exported file that contains all the pavement data for the selected database and the family modeling information for any families assigned to the pavement sections within the selected database.

- **Export pavement data and all family** - This extends the first option by adding all family models to the export file, even if they are not currently assigned to any of the exported sections. You must designate a database to export.

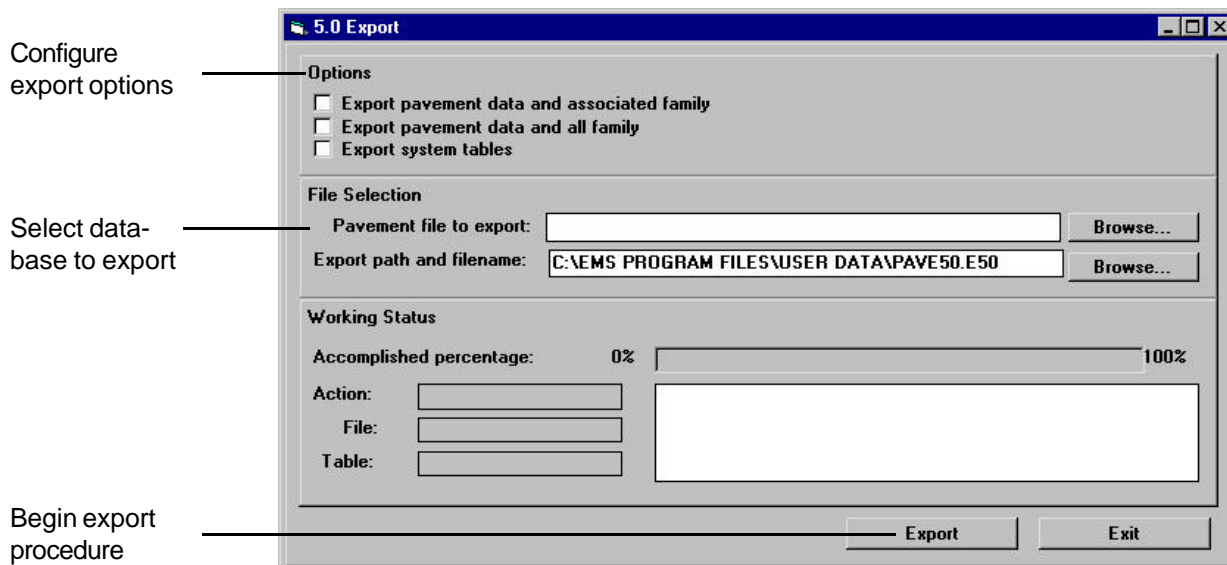
- **Export system tables** - This option includes all the common PAVER data contained in the Tables menu. No pavement data is exported if only option three is selected.

Configure the **5.2 Export** file by selecting the check box next to the appropriate option. As you configure your export file, consider that the system importing the file that you are creating imports all the information in the export file unless the importing user takes special steps not to overwrite existing files. If you specify that an export file includes all system files, the person importing your file will replace their system files with the system

files that you have exported.

If you have selected the first or second options, you must specify the pavement database to export. You may do this by clicking the **Browse** button in the **File Selection** area for Pavement file to export. The export file that is created will be located as indicated by the **Export path and file name selection**.

When these steps are complete, click the **Export** button located on the lower left portion of the export window. The **Working Status** portion of the export window displays the progress of the export process and indicates the completion of the export file. You may reconfigure the export options to create another export file or click the **Exit** button to



leave **5.2 Export**.

## 5.2 Import Procedure

The **5.2 Import** screen is divided into three sections, **File Selection**, **Options** and **Working Status**. In **File Selection**, click the **Browse** button for **Import file name** to specify the file to be imported. These include files with the formats e50 as well as e40. Select the type of file, e50 or e40, that you would like to import. Select the file. A second **Browse** button is associated with the **Import path**. The **Import path** refers to the location and name you wish to assign to the pavement data that is to be imported. When you identify an e50 file for a database under the **Import file name** selection, the default name for the database is placed in the **Import path box**. Clicking the **Browse** button associated with the **Import path** opens the **Open/Create Pavement Subdirectory** form. You can edit this form to change the default selection. The form shows the default path to your pavement databases and provides a pick list of your existing pavement databases. You can select an existing database (in which case the data you are importing overwrites the existing database) or type in a new name, and the import

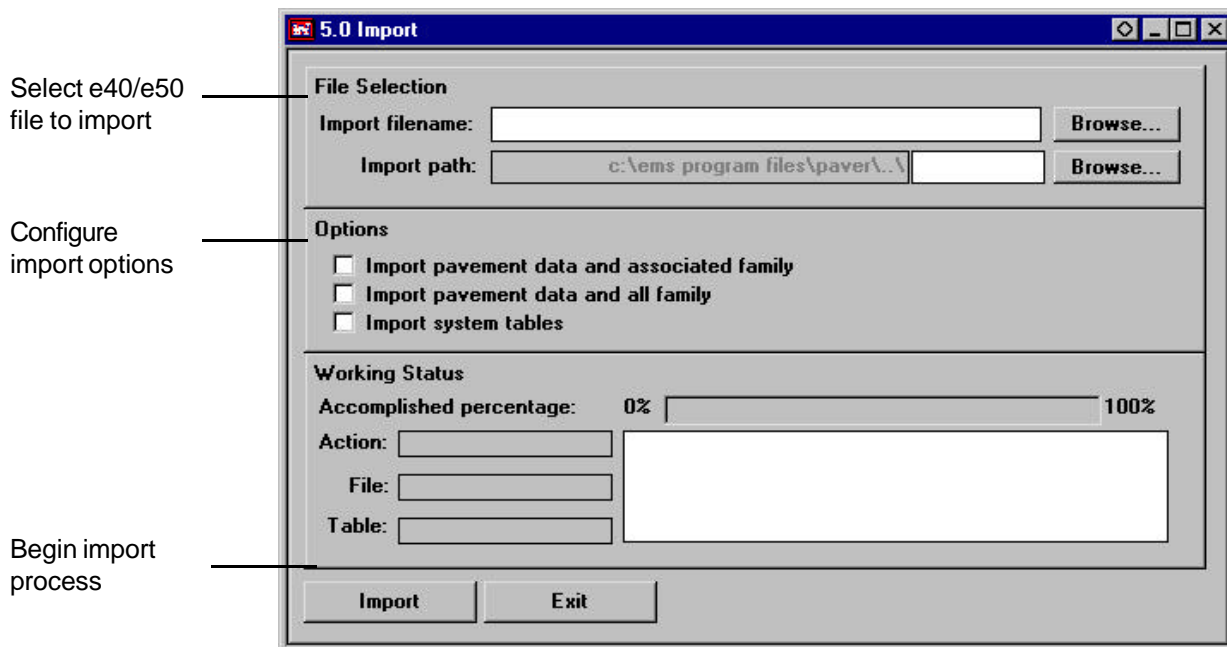
file is be copied to this new name.

The **Options** portion of the **5.2 Import** window shows the data included in the import file. These items are not user adjustable. If the first check box, **Import pavement database and associated family**, is checked, the import file includes only pavement data and the families that are assigned to those pavements. Unless you already have a pavement database with the same name as the imported database, none of your current data will be overwritten when you import this data.

Unlike the first option, **Import pavement data and all family** and **Import system tables** overwrites a portion or all of your PAVER system tables. The PAVER system tables are the data contained in the various data tables that are used to configure your work plan report, data entry pick lists, units and family models. Unless you wish to replace your current system tables with the system tables from another PAVER system, do not import them.

Clicking on the **Import** button launches the import routine. If the import routine does not cause any existing data to be overwritten, the import procedure will proceed uninterrupted. If the import routine is configured such that it will overwrite existing data (either pavement data or system data) a Windows message box appears and presents you with three options: Abort to skip this file, Retry to overwrite the current file, and Ignore to overwrite all files. Select the appropriate choice.

When the import procedure is completed the PAVER status window shows a “Done” message. Click the **Exit** button to leave the **5.2 Import** Window. The data you imported can be opened by choosing **File... Open** from the PAVER Menu. Select the imported database from the list of available PAVER databases.





# Database Verification Tools

This utility is used to perform a check of database components to see if there are any identifiable problems. This is not intended to be a comprehensive troubleshooting tool, but it is a good place to start when you encounter errors with PAVER. Each checkbox represents a separate segment of the verification process. A brief description of each follows:

- **Remove Duplicate Family to Section Assignments** - Only one family model is assigned to a section. If two or more are assigned, it follows the instructions given in the "Family Assignment" selection box to the right. You can specify that PAVER use the last non-default family or restore the default model.
- **Verify Section Construction History** - The LCD (Last Construction Date) must agree with data in the Work History table.
- **Verify / Reset Latest Inspection Indicators** - The last inspection date and corresponding PCI must be properly displayed with the section inventory information (checks data against inspection data).
- **Verify Distresses and Recalculate Conditions for all Sections** - This ensures that there are no unidentifiable distresses or zero quantity distress information and recalculates the PCI (last inspection date).
- **Verify Duplicate Major M&R** - No two records should have Major M&R activity listed for the same date in the Work History tab
- **Verify Work (Required/History) Descriptions** - All data in fields where input is restricted to drop lists must be valid data.
- **Report sections with missing data for PCI calculation** - All sections where required data for the PCI calculation is missing are reported.
- **Verify Inspection samples** - Inspection samples are verified.

A table of  
**Exceptions** is  
created

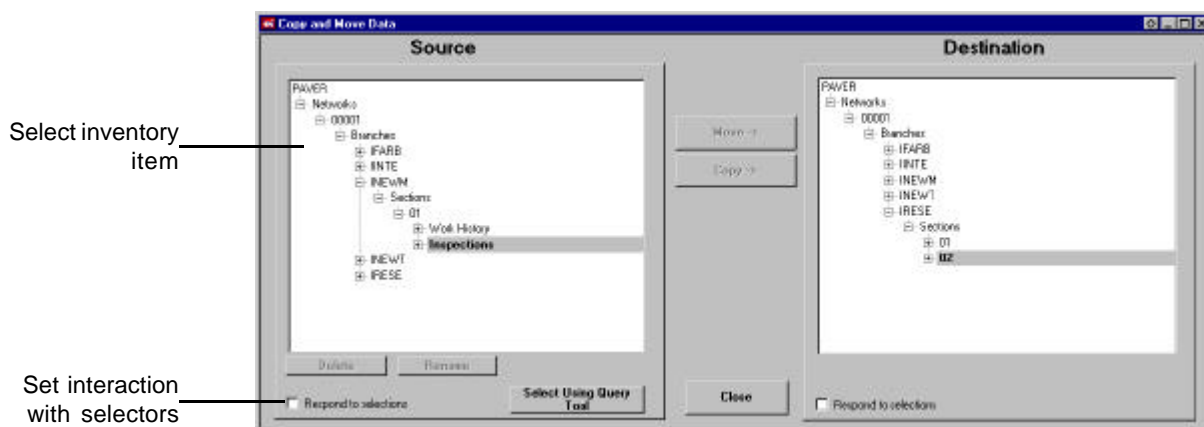
Network	Branch	Section	Exceptions
---------	--------	---------	------------

When the verification is complete, the utility produces a list of exceptions and corresponding sections. You can print the table, sort it, or export it to Microsoft Excel. To export, click with the right mouse button on the table to access these options. The **Print** button at the bottom of the window prints the table directly.

## Copy and Move Data

This new data manipulation tool included in PAVER 5 allows you to move or copy any available inventory item from one location to another. First, select the inventory item you wish to move or copy under **Source**. Then, select the **Destination** for the inventory item you wish to move or copy. **Move** relocates the item to the specified location, while **Copy** leaves the original in its location and place a copy in the specified destination. The **Move** and **Copy** buttons remain "grayed out" until an acceptable combination of source and destination locations are chosen. For example, you cannot move a network into a section. All data movement is restricted within the open database. To move data items between databases, you will have to combine databases using **Combine/Subset Database** described in **Database Tools-Combine/Subset Database** on page 29. After two databases have been combined, move or copy the data items and split the database back into its original components.

The **Copy and Move Data** utility also allows you to delete and rename items by highlighting the appropriate item and clicking **Delete** or **Rename** under the Source side. Also, you can use the **EMS Query Tool** to eliminate any data you do not want to view by selecting **Subset** from the **View** box and clicking on **Select**. The **Generate Selections** and **Respond to Selections** check boxes link the **Copy and Move** utility with the other selector tools. For all components of PAVER that use inventory items (Network, Branch, and Section), there is one active selection. Therefore, you can use the **Copy and Move** utility to **Generate selections** in other inventory selectors or the **Copy and Move** can be selected to **Respond to selections** made by another selector.



# Edit Image Paths

## Note

For more information about the **EMS Image Viewer**, see pages 60 and 61.

The **Edit Image Paths** tool gives users the ability to change the image path for images that are not stored in the database, but are stored in a remote location. The path to the image is stored in PAVER when images are not stored in the database. This tool allows the user to edit what image path is stored in the database.

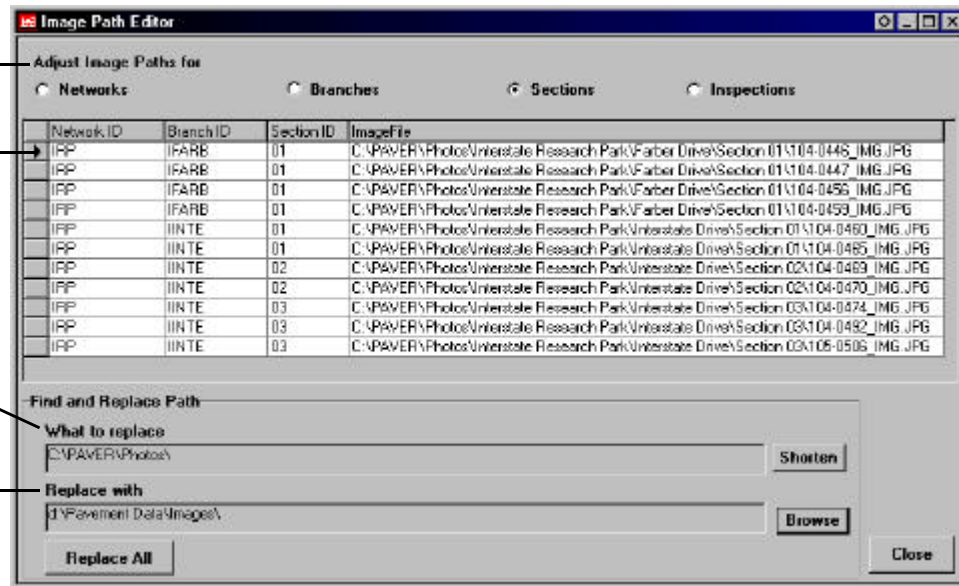
To begin, launch the **Edit Image Paths** tool from the **Visual Menu** under **Database Tools**. The image path can be adjusted for images stored at the **Network**, **Branch**, **Section**, and **Inspection** levels. All images stored at a specific level will be displayed in the table. To change the image path, first select the portion of the image path to be replaced in the **What to replace** box. The **Shorten** button shortens the path to be replaced on directory at a time. Once you have selected what is to be replaced, then select the new path in the **Replace with** box. The **Browse** button can be used to navigate to the new image location.

Select level with stored images

Table displays all images stored at selected level

Select portion of path to be replaced

Identify the new portion of the path



## Edit Image Path Example

The following example displays how to correctly use the **Edit Image Paths** tool. In the above screen shot, the old image path was:

**C:/PAVER/Photos/**Interstate\_Research\_Park/Farber\_Drive/Section01/\*\*.jpg

The new path is to be:

**D:/Pavement\_Data/Images/**Interstate\_Research\_Park/Farber\_Drive/Section01/\*\*.jpg

The portion of the path that needs to be replaced is in red. Under **What to replace**, the path should be shortened to “C:/PAVER/Photos”, and under **Replace with** the user should browse to the “D:/Pavement\_Data/Images” folder. All instances of “C:/PAVER/Photos” will be replaced with “D:/Pavement\_Data/Images”.

## Note

You only need to replace the portion of the path that has changed in order to correctly modify the image path.

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# GIS Tools

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## GIS Assignment Tool

### **Note**

The GIS Assignment Tool introduced in Version 5.1 replaces the PAVERGIS add-in.

Previous versions of PAVER used the PAVERGIS Interface add-in to access GIS capabilities. However, GIS tools are substantially upgraded in PAVER 5.1 in that GIS capabilities come integrated in the software and are increasingly easy to operate and employ.

### **What is the GIS Assignment tool?**

The GIS Assignment tool links the PAVER data for individual pavement sections to Geographical Information Systems (GIS) data. The GIS Assignment tool provides an internal ‘point-and-click’ interface to create, remove, or change the link between pavement sections and GIS map features. Using the same visual layout as the Selectors, the tool dramatically reduces the time required to create or change the link between GIS and pavement data. This tool is designed to work directly with the same ESRI shapefiles that are used in PAVER’s internal GIS capabilities.

### **Note**

For GIS tools to work in PAVER, all polygons must have **no z axis values**. GIS is limited to the x-y plane.

### **Using the GIS Assignment selection tool**

- Make sure the PAVER software is open with an active database. If a new database is not opened, PAVER will access the database used most recently by this machine.
- To practice using the GIS Assignment tool, open the SAMPLE.pvr sample database that should have been installed in the User Data folder with your installation of PAVER 5.2. To find the User Data folder, go to C:\
- Click the Visual Menu icon in the PAVER toolbar to open the Visual Menu dialog box.
- Select the “Selectors” option in the left section of the Visual Menu dialog box. A menu of options will appear in the right section of the Visual Menu dialog box.
- Choose the “GIS Assignment tool” option in the right section of the Visual Menu dialog box.
- Click the “Continue” button to open the GIS Assignment dialog box.

- If the GIS data is correctly associated to the PAVER database, the GIS Assignment tool dialog box that opens will contain both a tree listing of all pavement sections in the database, hereafter called the PAVER tree menu, as well as a graphical representation of the base, hereafter called the GIS map. [NOTE: For instructions on how to associate a GIS shapefile to a particular PAVER Database, see the Shapefile Conversion Tool under Add-Ins.]

- The PAVER tree menu is a tree listing of the Networks, Branches and Sections that are entered in the active PAVER database. Each pavement section has a unique identification associated with it in PAVER. This unique identification is used to link the gis features to the pavement sections. As a result, the link will be automatically maintained even if the network, branch, or section identifications change.

## GIS Assignment Tool Button Functions

The following tools, which are located at the top of the GIS Assignment tool dialog box, allow you to associate the PAVER data with the GIS map and to customize your view of the GIS map for easy use:

1. The **center** tool will zoom to the original view of the entire GIS map and will center the map on the screen. To use the center tool, simply click the “Center” button. For all GIS tools, the term “click” shall indicate that the left button on the mouse is used.
2. The **pan** tool allows you to move your view of the GIS map while maintaining the current zoom factor. To use the pan tool, click the pan button. The mouse icon will become a double arrow. Find the spot on the map you would like to move and place the double arrow over it. Click and hold down the left button on your mouse, move the double arrow to a new location and release. The view window of the GIS map will move so that the point first selected is moved to the point of release. The pan tool will continue to be selected, and may be used again, until you select another tool.
3. The **select** tool is the primary function of the GIS tools. It allows you to do any of the following: (1) to determine the PAVER section identification of a section on the GIS map, (2) to determine the location on the GIS map of a PAVER section, (3) to newly assign a PAVER section identification to a section on the GIS map, (4) to change the current PAVER section identification assignment of a section on the GIS map. The GIS map of the base assigns different colors to sections with different linkage distinctions. Specifically, areas represented in **green** are assigned to a pavement section in the database, while areas represented in **yellow** are *not* assigned to a pavement section. Sections represented in **red** identify the section(s) that are current or active. The current section(s) will normally be highlighted in the PAVER tree menu. The select tool will continue to be active, and may be used again, until you select another tool.

### Note

The colored hatches have different meanings. **Green** is an assigned section, **Yellow** is a non-assigned section, and **Red** is the active and assigned section.

### *(1) to determine the PAVER section identification of a section on the GIS map*

To use the select tool, click on the button marked “Select”. The mouse icon will change to an arrow and a question mark. Click on a **green** section and that **green** section will become current, changing the color to **red**, while the corresponding section identification will be automatically highlighted in the tree menu to the left.



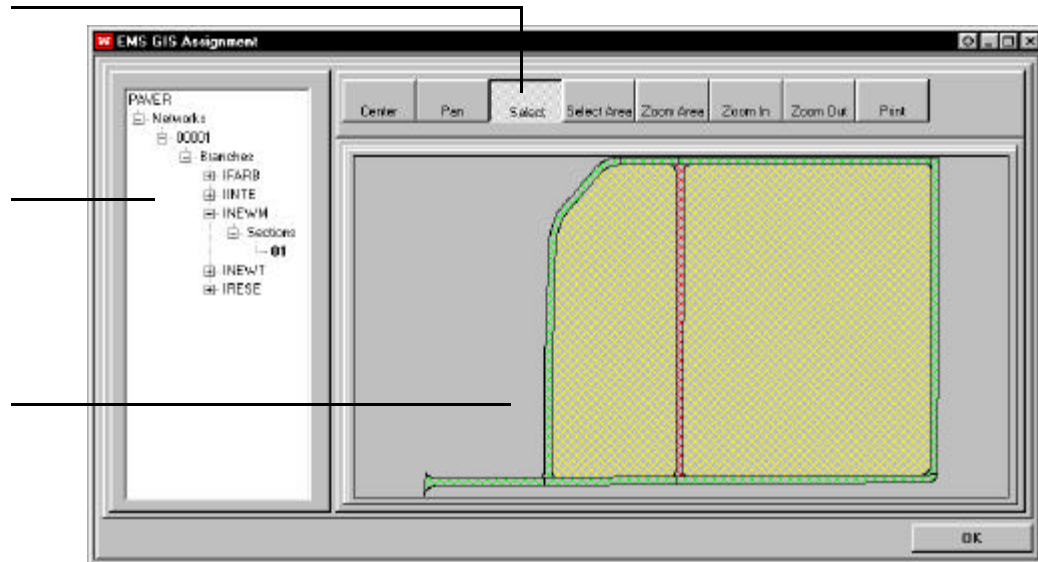
*(2) to determine the location on the GIS map of a PAVER section*

At any time, whether the select tool is active or not, click on a section identification in the PAVER tree menu, and the corresponding area(s) will be highlighted in **red** on the GIS map. This section and all these areas associated with this particular section identification will become active.

The **select** tool is used to assign or *un-assign* sections.

The tree is used with the select tool to assign sections.

Green sections are assigned, Red sections are active, and Yellow sections are not assigned.



*(3) to newly assign a PAVER section identification to a section on the GIS map.*

Verify that the select tool is active. If it is not, click on the select button. Click on the area you want to assign a PAVER section identification to, so that it is shown as current. This section will therefore be **red**. Next, click on the section identification you want to be associated with the section.

It is possible, and often desirable, to include more than one area in one section identification. You may add an additional area to a section by highlighting the particular section identification in the PAVER tree menu and by clicking on another area, so that it is current. The additional area will be added to the section and any previous areas associated with the section identification will remain associated.

*(4) to change the current PAVER section identification assignment of a section on the GIS map.*

Click on an area that was **green** and is now **red** and that area will turn yellow and will no longer be associated with any pavement sections. Click on a **yellow** area, and that area will become **red**, indicating that it is now an area associated with the current section. The current section(s), or any section represented in **red**, will always be assigned to a section, therefore when another section becomes current, the original **red** section will change to **green** and will be associated with the section that was highlighted last in the PAVER tree menu. Click on a new section in the PAVER tree menu, to change the section identification assignment of the current, or **red** section.

4. The **select area** tool allows you to determine the PAVER section identification of a section on the GIS map without changing the assignment of the active area or the current section or the association of an area to a section identification. To operate the select area tool, click on the select area button. Click on any section of any color and the corresponding section will be highlighted in the PAVER tree menu. The select area tool will continue to be active, and may be used again, until you select another tool.

5. The **zoom area** tool allows you to change the zoom factor of the GIS map and allows you to zoom in on a specific area quickly. To use the zoom area tool, click on the “Zoom Area” button. The mouse icon will become a cross. Position the intersection of the cross at one corner of the desired window, click and hold the left button on the mouse and drag it to the opposite corner of the desired window, creating a box outline. If you begin the zoom window at the upper-left corner, you will drag to the bottom-right and vice versa. If you begin the zoom window at the upper-right corner, you will drag to the bottom-left and vice versa. Release the right button on the mouse and the GIS map will automatically zoom to the largest view that includes everything in your zoom window. The zoom area tool will continue to be active, and may be used again, until you select another tool. To decrease the zoom factor, you will have to either use the center tool, and start over, or use the zoom in tool.

**Note**

The GIS assignment tool has the same buttons found on the GIS and Tree/GIS selectors.

6. The **zoom in** tool allows you to zoom in on a specific location. To use the zoom in tool, click on the “Zoom In” button. The mouse icon will become an **arrow**. Position the tip of the arrow over the point you want to zoom in on, and click the left button on the mouse. The GIS map view will decrease, as the scale of the map increases at scale factor of **2:1**. The new view window will be centered on the tip of the arrow. The zoom in tool will continue to be active, and may be used again, until you select another tool.

7. The **zoom out** tool allows you to zoom in on a specific location. To use the zoom out tool, click on the “Zoom Out” button. The mouse icon will become an **arrow**. Position the tip of the arrow over the point you want to zoom out of, and click the left button on the mouse. The GIS map view will increase, as the scale of the map decreases at scale factor of **2:1**. The new view window will be centered on the tip of the arrow. The zoom in tool will continue to be active, and may be used again, until you select another tool.

8. The **print tool** allows the user to print a hard copy of the GIS map. To use the print tool, simply click the button marked “Print”. The default print setup will print the entire GIS map only on a letter size sheet to the default printer. The print setup may be changed, using the File, Printer Setup menu.



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# PAVER Shape File Converter

## Converting from PAVER 4.x to 5.2

### Note

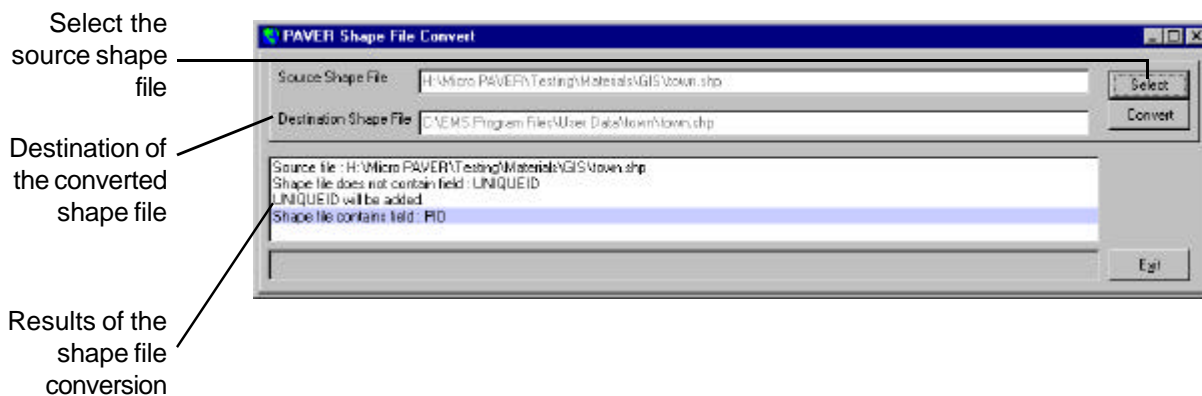
When converting shape files, the database that is to be associated with the shape file must be online for the procedure to work correctly.

Additionally, all the files that go with the shape file (\*.shp, \*.dbf, \*.sbn, and \*.shx) must be in the same folder when converting.

The **PAVER Shape File Converter** is used to convert shape files that were used in version 4.x of PAVER to be used in version 5.2 of PAVER. The difference between shape files in version 4.x and version 5.2 is that in 5.2 shape files now contain a Unique ID. The conversion of the shape file will check to see if the file contains a Unique ID and add the field, if necessary. Converting coverages from PAVER 4.x to 5.2 is a two step process. You must first take the PAVER 4.x coverage file into ArcView and convert the \*.cov file to a shape file (\*.shp). To complete the process, the shape file must be converted using the **PAVER Shape File Converter**. Once the shape file is converted, the process is completed.

## Shape File Conversion Procedure

The **PAVER Shape File Converter** module contains three sections. The first section displays the **Source Shape File**, the second section displays the **Destination Shape File**, and the third section displays the results of the conversion process. You must first locate the shape file you wish to convert. This is done by clicking the **Select** button to browse your computer for appropriate files. Once the file is selected, PAVER then checks that the file contains a UNIQUEID and PID. PAVER also automatically sets the destination of the converted file in the folder for the online database. To complete the conversion process click the **Convert** button. As the conversion takes place, the results will be shown in the lower window.

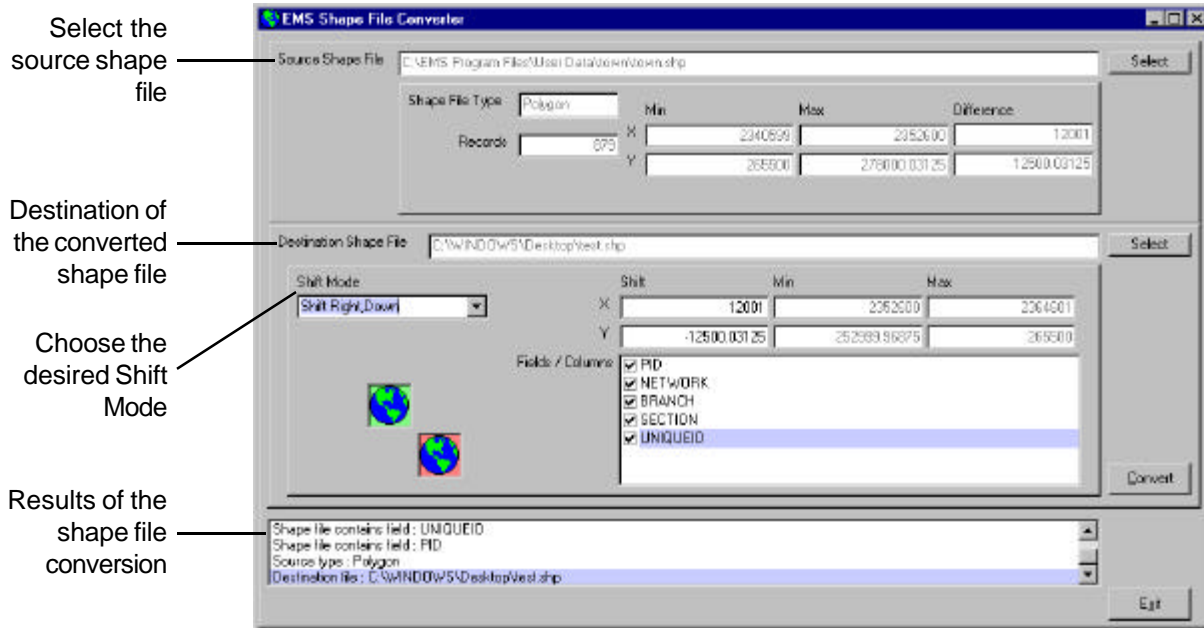


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## Shape File Coordinate Shift

The **Shape File Coordinate Shift** module functions like the PAVER Shape File Converter discussed above. However, this module also allows you to shift the coordinates of the shape file during conversion. Similarly, the **Shape File Coordinate Shift** is also divided into three sections. The first section displays the **Source Shape File**, the second section displays the **Destination Shape File**, and the third section displays the results of the conversion process. You must first locate the shape file you wish to convert. This is done by clicking the **Select** button to browse your computer for appropriate files.

Once the file is selected, PAVER then checks that the file contains a UNIQUEID and PID. The coordinates of the selected shape file are displayed. Once the file is loaded, you may then click the **Select** button in the **Destination Shape File** area of the box. After selecting the destination file you are then able to select the appropriate **Shift Mode** for the converted shape file. You may select a premade shift mode or a **User Specified** shift mode from the drop down box. To complete the conversion process click the **Convert** button. As the conversion takes place, the results will be shown in the lower window.



# Selectors

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## Navigating the Pavement Inventory

PAVER provides several options for choosing the portion of inventory with which the user wants to work. These "selectors" make moving from one part of the inventory to another quick and easy. The selectors are accessed directly from the **Selection** button on the main toolbar or by going into the **Visual Menu** and choosing **Selectors**. Other parts of the program that require the user to specify a component of the inventory (i.e. Network, Branch, Section) respond to the input received from the selector tools. There are three selectors: **Tree**, **Tab**, and **GIS**. A combination of two, referred to as **Tree and GIS**, can also be used.

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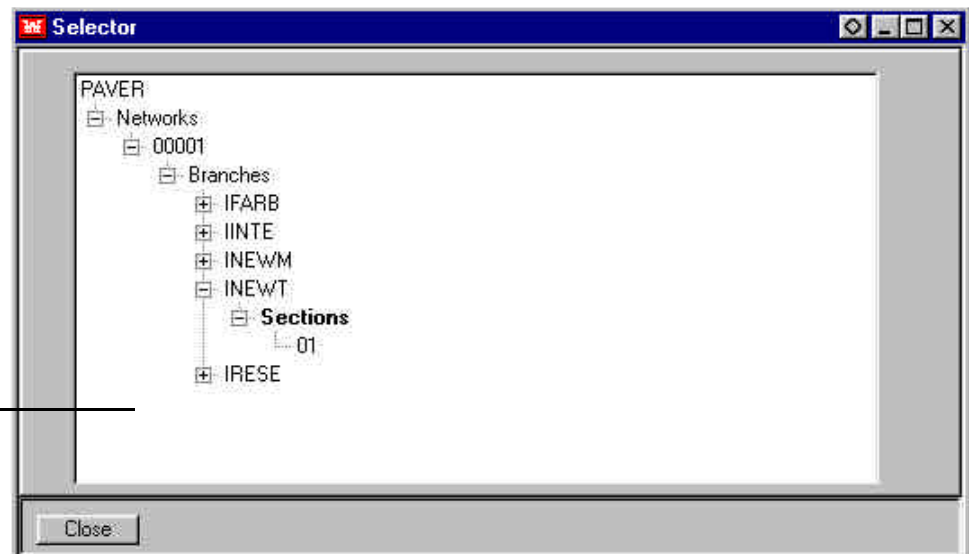
## The Tree Selector

### Note

For databases with more than 500 Branches, the **Tree selector** may experience very long load times. It is recommended that you either split the database or use a different selector.

Since the inventory in PAVER is represented in a hierarchy similar to the file structure in Windows, it is logical to navigate this structure in a tree format. Much like the Explorer tool in Windows, the Tree selector allows you to move through the hierarchy of your database and select the specific Network, Branch or Section from which information is needed. This is done by moving down the "tree" until you arrive at the desired location.

Navigate through  
tree structure

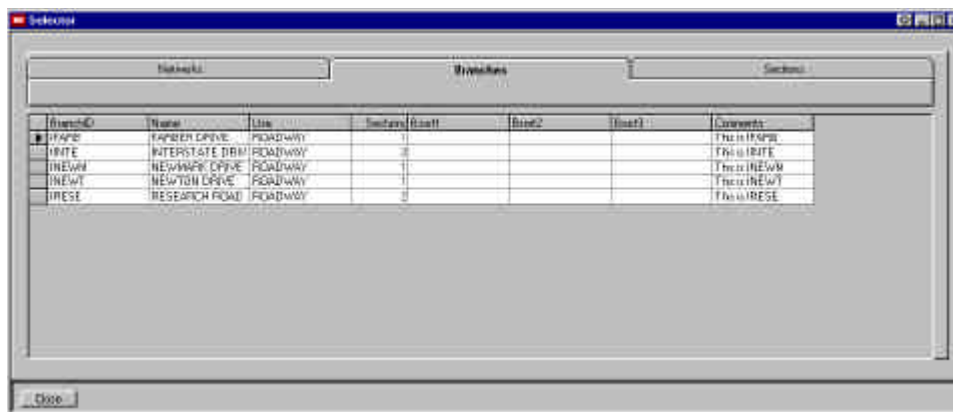


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## The Tab Selector

For those who like the PAVER 4.2 method of selecting inventory items by selecting from the **Network**, **Branch** and **Section** file cards, the **Tab Selector** has a similar look and feel. Starting with the **Network** tab and working across to the **Branch** and **Section** tabs, the user can select and view data at any level of the inventory. Along with selection capability, all data contained at each level can be viewed directly from the same window the selection is made. Unique **ID** numbers and user defined sort field data are also now available for viewing with this selector.

Navigate inventory with tabbed index cards to find selection

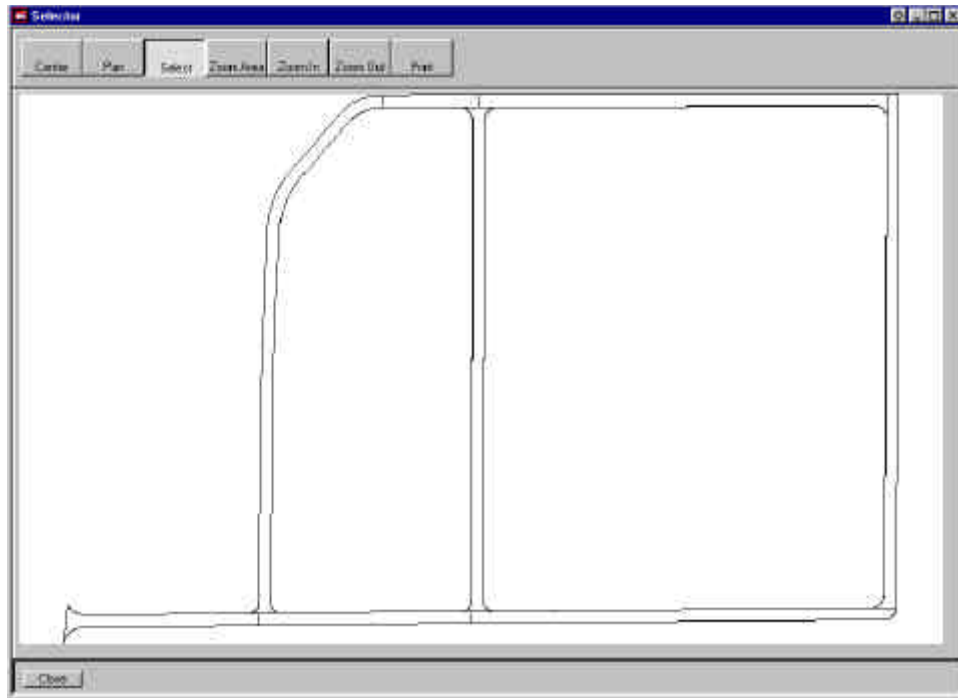


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## The GIS Selector

Because GIS has become more integrated into Micro PAVER, the user can now select an inventory item by using a GIS coverage. This first requires the database to be linked to a coverage via the PAVER GIS process. Once the GIS link has been completed, the map can be viewed via the **GIS Selector**. By simply pointing and clicking on any polygon (or arc) in the coverage, the selector makes the link to that section. Like the **Tree Selector**, the **GIS Selector** only allows selection. No data is displayed.

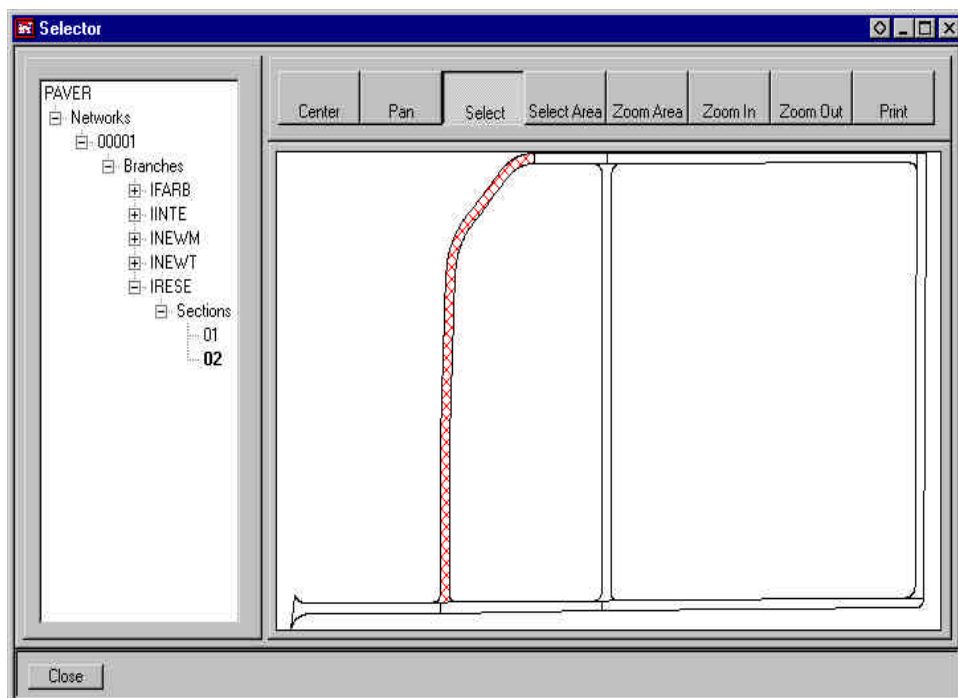
Locate an inventory item by selecting it via GIS



## The Tree and GIS Selector

The last choice from the **Selectors** menu is the **Tree and GIS Selector**. This is simply a combination of the **Tree and GIS Selectors** both displayed in one window. This allows you to select an inventory item using the easiest method for the particular inventory item. For example, if you know only the location of the pavement, the **GIS Selector** is most useful. If you need to trace through the hierarchy, the **Tree Selector** is the logical choice. The **Tree and GIS Selector** combines both of these features into one compact tool.

Selecting an inventory item with the tree is aided by GIS



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# Inventory

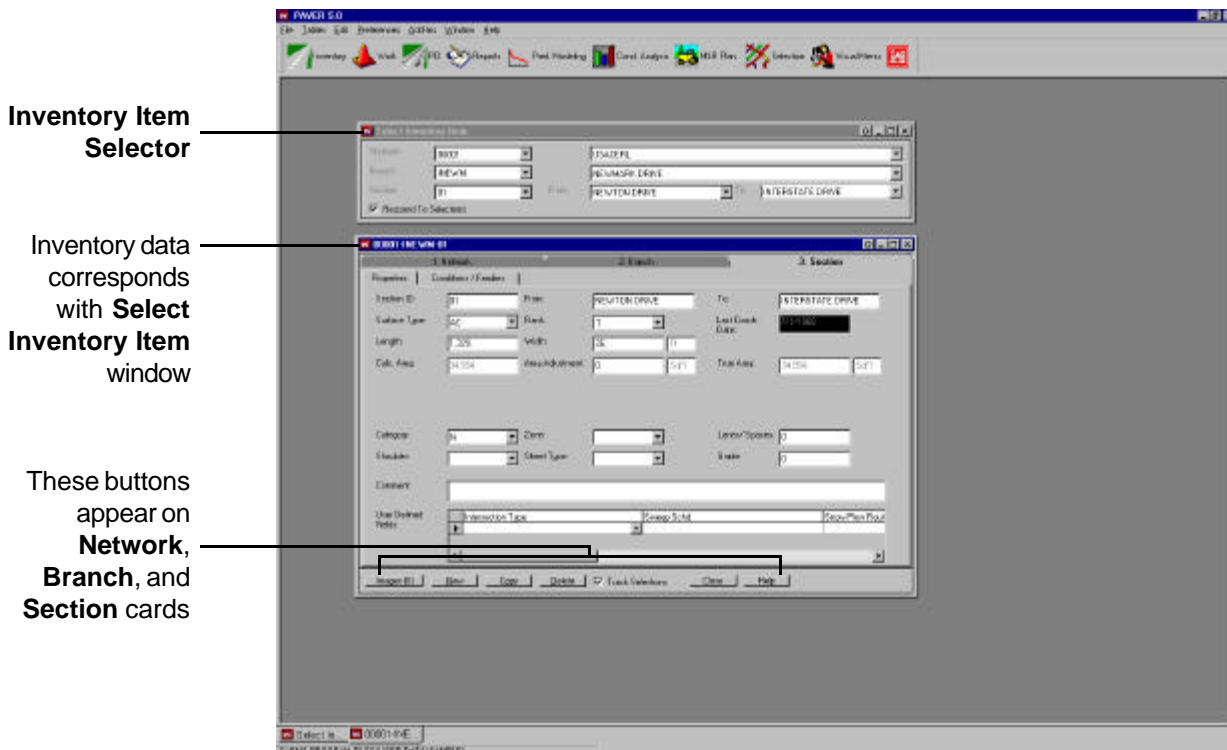
## Definition

### Managing Pavement Inventory - Basic Operations

The **Inventory** button provides tools to view, edit, and define pavement networks. Clicking on the **Inventory** button opens two windows.

The **Select Inventory Item** window is a series of drop-down boxes that allow you to navigate to a specific point in the inventory. Select the particular inventory item by working down the hierarchy of the database, from network to branch, then to section. At each level, you can select an item via **ID** or **Name**.

The larger window is the inventory data window. In this window, you can edit inventory data. To access data for a particular level, click the tab for **Network**, **Branch** or **Section**. In order to change the displayed inventory item, locate the item in the **Select Inventory Item** window. The inventory data window updates itself accordingly.



At the bottom of the inventory data card, there is a check box for **Track Selection**. If this box is not checked, the inventory data card will not change when a new inventory item is chosen in the **Select Inventory Item** window.

You may move to different fields on the inventory data form by clicking on the field you wish to edit in order to enter information. You may also move from field to field on the form by pressing the tab key. Each press of the tab key shifts the selected field once to the right. Once the end of a row has been reached, a press of the tab key shifts the selected field down one row to the furthest left field.

Data fields in PAVER 5.2 only accept entries of a determined type of characters. For example, a distance field can contain only numeric information. If you try to enter non-numeric characters into a distance field, the program will not accept your entry.

#### **Note**

To view data for a specific network, it must be chosen in one of the **Inventory Item Selectors**.

Each of the inventory cards (**Network**, **Branch**, and **Section**) have six buttons along the bottom of the form. The **New** button is for adding new inventory items. The **Copy** button is used to create a new network, branch, or section identical to the selected network, branch, or section except that the **Network**, **Branch** or **Section ID** will include the characters “CC” to indicate that it is a copy. None of the copied network's children (branches and sections) are copied when a network is copied. Likewise, when a branch is copied, none of its sections are copied.

Clicking the **Delete** button deletes the selected network. The **Help** button starts the PAVER help system. **Pictures** launches the **EMS Image Viewer**. For more instructions on the use of this, please see **EMS Image Viewer**. The **Close** button closes the Inventory program.

You may also assign values for the user defined fields. This can be done only when the parameters for the user defined fields have been established (See **System Tables-Define User Fields**). Once this is done, the inventory can be sorted based on user defined criteria for many applications in PAVER.

## **Creating a Network**

The first step in building a pavement inventory for a military installation, city, or airport is to create a network. A hierarchical structure exists for pavement inventory items in PAVER 5.0. Networks are the parents of branches, and in turn branches are the parents of sections. In order to create pavement branches and sections, you must first create a network.

To create a network, click on the **Inventory** button on the PAVER button bar. The inventory data form appears with the **Network** file card displayed. Click the **New** button at the bottom of the Network file card, which populates all fields identifying the current network. The fields on the network form for **Network ID**, **Name**, and **Comments** should be edited to the desired values. You may also enter data in any **User Defined Fields** that you have created. See the above section on how to use the functions located at the bottom of the inventory file cards.



Network file card

Network level comments

## Creating Branches

To create a branch, click the **Inventory** button on the PAVER button bar. The inventory data window appears with the **Network** file card displayed. Click the file card tab **2. Branch** for access to the Branch file card. If you have just added a new network, that network will have no branches defined. Click the **New** button at the bottom of the file card to enter a new branch. The fields on the branch data entry form becomes populated with the label "new" or is blank (depending on the type of field, i.e., text, numeric, or pick list). Enter the appropriate values. Some fields are locked. They automatically respond to section data once sections for the branch are created. For more specific information on how to use the functions located at the bottom of the **Branch** card, see the section on **Managing Pavement Inventory**.

### Note

You may add items to the **Use** pick list under **Define User Fields** in **System Tables** if the choices are not adequate.

The contents of the **Use** field are limited to a single value that is selected from a preexisting list of choices. To enter a value in the **Use** field, select the field. A down arrow appears on the right side of the field data entry area. Click once on the arrow and a list of available choices appears in a scrolling pick list. Select an item from the list by pointing to the item with the mouse and pressing the left mouse button.

If there are more items in the list than can be shown in a single short list (usually 5 to 10 items), the list is displayed with a scroll bar arranged along the right side of the list. To select an item not visible in the list, point to the scroll bar down arrow with the mouse and press the left mouse button. The list scrolls down. To scroll back up the list, point to the up arrow on the scroll bar and press the left mouse button. When the pick list is very long, you may want to locate items in the list by typing the first character of your selection. The program seeks out matches for the characters you type. To use the seek feature, select the pick list field you wish to edit and type the first character of the selection you want and the pick list moves to the characters you type.

If the pick list does not contain the item you wish to enter, you need to add the item to the pick list. To enter a new item to the **Use** pick list, select **Tables** from the PAVER Menu located along the top of the PAVER screen. From the **Tables** sub-menu, select the **Inventory Pick List** selection and then the **Branch Use** tab. See the **System Tables** section under **Inventory Pick Lists** for further instructions.

The **Branch** file card contains three area fields: **Sum of Sect. True Area**, **Area Adjustment**, and **True Area**. The **Sum of Sect. True Area** field is the sum of true section areas of the branch. The **Area Adjustment** field is used to reflect special knowledge you have about branch area that is not incorporated in the **Sum of Sect. True Area**. Decreases in branch area should be entered as negative values. Note that the **Section** card also has an area adjustment field (**Section Area Adjustment**) so you do not need to reflect section level area adjustments in the branch **Area Adjustment** field. **True Area** is **Sum of Sect. True Area** plus **Area Adjustment**. **True Area** is the value used in PAVER calculations and reports.

Branch file card

You may create your own branch uses if **Use** options are not adequate

These fields may be configured by the user

## Creating Sections

To create a section, click on the **Inventory** button on the PAVER button bar. The inventory data form appears with the **Network** file card as the active form. Click the file card tab **3. Section** to make the **Section** data card the active form. If you have just added a new branch, that branch will have no sections defined.

Click the **New** button at the bottom of the screen to enter a section. Enter section information in the rows of fields starting with **Section ID**. The **Calculated Area** is calculated based on the **Length** and **Width** information you enter. The **Calculated Area** field cannot be edited. The **True Area** field defaults to the value in the **Calculated Area** field. However, this value can be adjusted to reflect cut outs or other adjustments affecting the actual section area in the **Area Adjustment** field. Although the **Area Adjustment** field is useful for irregularly shaped sections, you must still enter **Length** and **Width** information. Failure to do so will create problems in other functions of PAVER.

The **Unit** field cannot be directly edited by the user (see **System Tables** section under **Misc. Other Tables/ Unit of Measure (Field) Settings** on page for details).

Some of the section fields can only be changed using the choices in the pick lists. Pick list choices can be edited or expanded through the **Tables** button above the PAVER button bar. (See **System Tables** section under **Inventory Pick Lists** on page 41 for further directions.) After the basic section information, there are two boxes, **Conditions** and **Families**. Condition information cannot be edited from the **Section** file card. Condition information can be entered in the routines run from the **Field Inspect** button on the PAVER button bar. The family assignment for the section (or other sections) can be changed by using the mouse to point at the **Family** box and double clicking the left mouse button. Family information can also be assigned under the **Pred. Model** button.

The **Section** file card contains three area fields, **Calc** (Calculated) **Area**, **Area Adjustment**, and **True Area**. The **Calc Area** field is the product of the section's length times width. The section **Area Adjustment** field is used to reflect special knowledge you have about section area that is not incorporated in the area calculation. Decreases in section area resulting from items like cut outs should be entered as negative values. Note that the **Branch** file card also has an area adjustment field (**Area Adjustment**) so you do not need to reflect Branch level area adjustments in the section **Area Adjustment** field. **Calc Area** and **Area Adjustment** are added to obtain **True Area**. **True Area** is the value used in PAVER calculations and reports.

Three user defined section fields are arranged along the bottom of the screen. These fields are used to contain user defined inventory information and can be used to sort and select inventory, maintenance, and inspection information.

Section file card

Use **Area Adjustment** to reflect cut outs

00001-INEWM-01

1. Network 2. Branch 3. Section

Properties Conditions / Families

Section ID: 01 From: NEWTON DRIVE To: INTERSTATE DRIVE

Surface Type: AC Flank: T Last Const. Date: 7/1/1998

Length: 1.329 Width: 26 Calc. Area: 34.554 Area Adjustment: 0 True Area: 34.554

Category: N Zone: Lane/Space: 0

Shoulder: Street Type: Blade: 0

Comment:

User Defined Fields: Intersection Type Sweep Sched Snow Plow Rout

Images (0) New Copy Delete Track Selections Close Help

## Conditions/Families

This tab provides a quick reference to condition and family assignment data for the selected section in four preset views:

- **View all latest conditions** – This produces a table with the latest (last computed or last entered) condition indices associated with this section.
- **View one condition index for all dates** – This shows every date that one selected index occurred for the current section. A drop down-box allows you to choose the condition for which you would like to display information.
- **View all indices and dates** – This is the complete listing of every condition index for every date occurrence listed in the section history.
- **View family assignments** – This shows what the current family assignment (Prediction Model) is for the selected section. Double clicking in the **Family** column opens the **Change Family Assignments** window, providing you the option to change the family assignment.

As with other tables in PAVER, right clicking on any of these tables will allow you to revise the table layout, sort the data, print, or export the data.

**Condition and Age Categories, Condition Type Selection, and User-Defined Distress Indices** are all discussed in **System tables** under **Condition Types**.

View the conditions and family assignments for a section

### Note

The **Conditions/Families** tab provides a quick way to see the conditions associated with all construction and inspection dates.

Date/Condition Index	Condition Value
7/23/1995 PCI	10
12/5/1994 PCI	22
10/13/1993 PCI	24
10/21/1992 PCI	28
10/16/1991 PCI	28
6/6/1989 PCI	41
10/13/1986 PCI	44
4/22/1986 PCI	47
9/30/1984 PCI	68
2/24/1984 PCI	70

# EMS Image Viewer

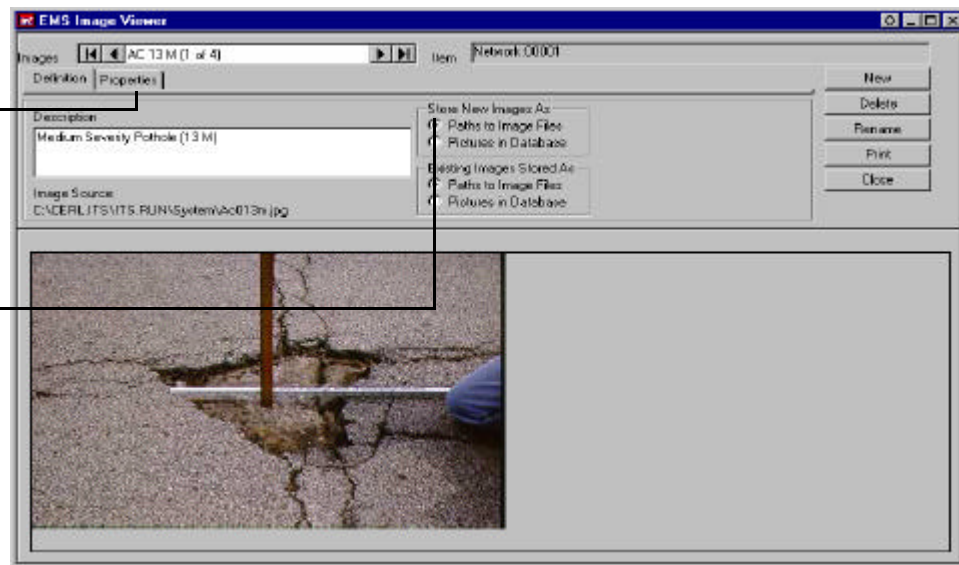
## Note

Use the **EMS Image Viewer** to store relevant pictures such as distresses or individual sections.

The **EMS Image Viewer** manages the saving, recalling, viewing, and enhancing of pictures, drawings, and other stored images in the PAVER program. The **EMS Image Viewer** is accessed from the **Inventory** section of PAVER 5.2. The network, branch, and section cards of the **Inventory** program each have a button located along the bottom of the form labeled **Images**. In order to edit pictures for a specific network, branch or section, the item must be actively displayed in the inventory data window at this time. To open the **EMS Image Viewer**, click on the **Images** button.

Adjust images or add special effects

Edit how images are stored



## Store an Image

## Note

For information on how to **Edit Image Paths**, see page 43.

In the **EMS Image Viewer** window, there is a box titled **Store New Images As**. The options offered for storage are **Paths to Image Files** or **Pictures in Database**. Since image files are typically large, including them in the database substantially increases the size of a database. An alternative is to attach the picture to the database through a "path" to the image. The image would be stored in a fixed location, and PAVER would simply set up a path link to the image. However, an image stored as a path will not be included in the e50 file when the e50 is created for storage or transfer. In order for the images to follow the database, you will need to copy and send the images separately, making sure to place them in the same path on the new machine as they were in on the original. Select appropriate storage option and click on the **New** button. You are prompted to select the file containing the picture you wish to load. The drop box at the bottom of the window is used to specify the format for the picture. PAVER supports images stored in JPG, TIF, GIF, BMP, TGA, PCX, and PCT formats. Once you have selected the image file to add, use your mouse to click the **Open** button. The image appears in the **EMS Image Viewer** window.

If you wish to change the storage option for an image later, select the image and change the selection in the box titled **Existing Images Stored As**.

## Viewing Images

To view and select an image from the list of saved images, use the scrolling tool at the top of the window. If you add only one image for an inventory item, it always appears in the **EMS Image Viewer** window when you access the **EMS Image Viewer** for that inventory item. However, you may associate more than one image with an inventory item. When multiple inventory images are associated with an inventory item, you can scroll through the images by clicking the image scroll buttons located on the upper left corner of the **EMS Image Viewer** window.

## Edit an Image

There are two tabs in the **EMS Image Viewer** window, **Definition** and **Properties**. Clicking on the **Definition** tab allows you to view the selected image and to determine how the image is stored. Clicking on the **Properties** tab will allow you to make various graphic adjustments to the image as well as add a variety of special effects. Click on **Edit** for the desired feature and click on OK once you have made your adjustments. A preview of the image will be shown in the **EMS Image Viewer** window. Save changes by clicking on **Save Edits** or restore the original image if the change is undesirable by clicking on **Restore Image**.

## Other Image File Options

Five other commands are available in the **EMS Image Viewer** window:

- **New** - A new image is attached to the network, branch, or section that was active when the **Image** command was invoked.
- **Delete** - The current image in the viewer is deleted.
- **Rename** - This renames the image within the viewer, but it will not change the file name.
- **Print** - This command invokes the Windows "Print" window for printing a copy of the selected image
- **Close** - This closes the **EMS Image Viewer** window.

---

## Additional Field Data (Traffic, Test, Work Data)

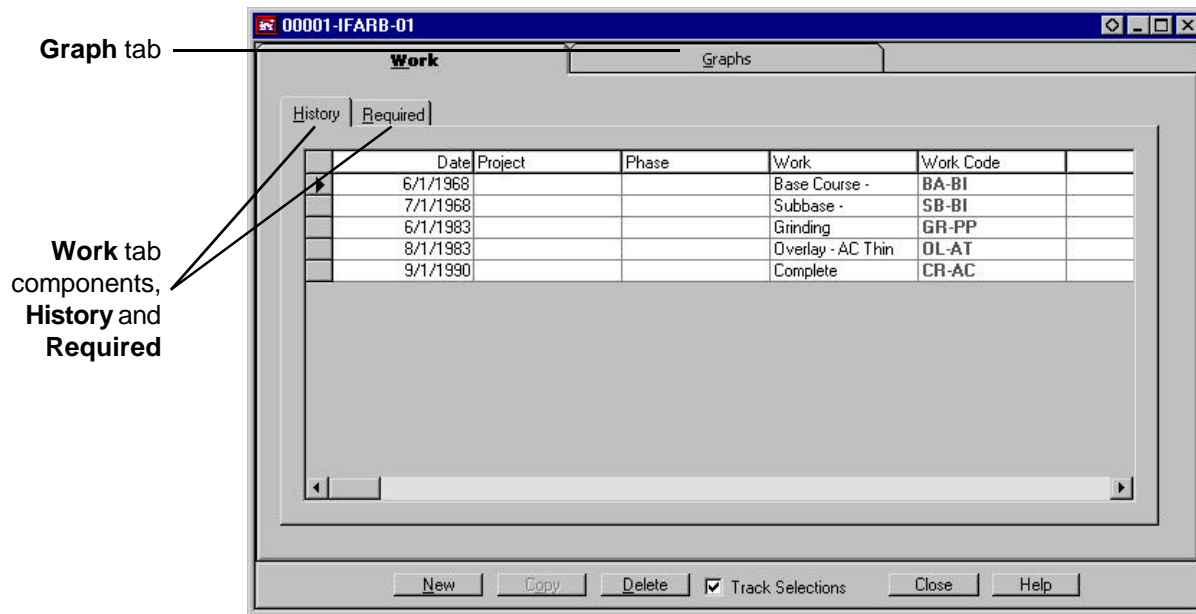
### Work

Extensive connections exist in PAVER between construction date and predicted PCI. The system must have an accurate account of the last construction date for each section in order to accurately predict future pavement performance, maintenance requirements, costs, and inspection schedule. PAVER updates the last construction date for the section to correspond with the most recent major M&R. The **Work History** and **Required** forms provide an interface for easily entering work history data of a particular pavement section. In order to enter work information for a particular section, it must be selected in the **Select Inventory Item** window.

For a new record, click on **New**, then enter the information either by typing or selecting from a pick list of options. You may edit entries by typing over those in existence. Micro PAVER does not allow the user to delete ALL of the construction dates in a work history profile. If there is only one construction date, the entry cannot be removed. The **Copy** button invokes the **Copy and Move Data** utility - described in a following paragraph - and can be used to move other data elements, to compatible places in other areas of the database. In this case, work records will be copied or moved.

Maintenance, repair, and construction activity information is recorded on the **Work** file card. The **Work** table is subdivided into **History** and **Required** tables. Future or planned work is entered into the **Required** table. When the activity has been completed, scroll to the last column of the **Required** table and change the **Work Completed** field in the **Work Required** table to indicate **Yes**. This will cause the record to be transferred to the **Work History** table. If you select the **History** tab, the table refreshes and the completed work activity will then be part of the **Work History**.

The **Graphs** tab also contains a graphic component that presents graphs for each section relating condition and work history.



## Traffic

This window is for entering previously collected traffic data. The **Traffic** table has a special copy feature for replicating information to multiple sections. Click the **Copy traffic to rest of branch** button to copy the information for the active traffic section to the other sections in the branch.

## NDT and Test

This window contains two tabs, **NDT Tests** and **Other Tests**. These tables are for the collection of basic pavement test results.

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# Inspection

## PCI and Distress Indices

### Field Inspection - Basic Operations

Collecting and recording of field inspection data are probably the most frequently repeated tasks in PAVER. The **Inspection** component of PAVER can be launched from the **Visual Menu** under **Inspection** or from the **PAVER Button Bar** via **PCI**.

### Entering Inspection Dates and Samples

To enter inspection information, first verify that the desired network/branch/section is selected using the **Select Inventory Item** window. Notice that the name of the window corresponds to the network/branch/section that is currently selected. The **Inspection** drop-down box allows you to select a previous inspection by the inspection date. This is useful if you need to add or edit information for a previous inspection. If you wish to enter information for a new inspection, click the **Edit** button next to the **Inspection** window. The **Inspections** window appears, displaying a list of past inspections. Click the **New** button and a new inspection, with the current date, appears at the top of the list.

**Select Inventory Item** window

Create a new inspection

**00001-IFARB-01**

Summary Data

Branch User: 00001-IFARB-01 Section Surface Type: 4M2 Section True Area: 47.000 4M2

Inspection Date: 1/1/2000 Edit Inspections Inspection Comments: Calculate Conditions

Sample Unit: 8 Edit Sample Units

Sample Unit Size: 2000.00 Soft No distresses from data inspection

Distress Type

☒ 01 ALLIGATOR CR ☐ 06 DEPRESSION ☐ 11 PATCH/OUT CUT ☐ 16 SHOVING

☐ 02 BLEEDING ☐ 07 EDGE CR ☐ 12 POLISHED AG ☐ 17 SURFACE CR

☐ 03 BLOCK CR ☐ 08 AT 100' CR ☐ 13 POT HOLE ☐ 18 SWELL

☐ 04 BUMPS/SAGS ☐ 09 LANE SH DROP ☐ 14 RR CROSSING ☐ 19 WEATH/RAVEL

☐ 05 CORRUGATION ☐ 10 L T CR ☐ 15 RUTTING

Distress Severity

☒ Low ☐ Medium ☐ High ☐ N/A

Distress Quantity

5.00 Soft

Distress	Description	Severity	Quantity	Unit	Comments
1	ALLIGATOR	L	6	Soft	
1	ALLIGATOR	M	30	Soft	
4	BUMPS/SAGS	L	28	FI	
7	EDGE	L	142	FI	
7	EDGE	M	15	FI	

Add Distress Delete Distress Replace Distress

Previous Sample Unit Next Sample Unit

Images: [X] Track Selections Close Help

### Note

Distress information entered into PAVER is associated with a specific date.

When you first create a new inspection date, the new inspection has the same sample information as the previous inspection. If the actual inspection date is different, click on the date and edit it. You may also edit the other fields in the window, including entering a comment for the inspection. When the inspection date and other fields are as desired, press the **Close** button to return to the **Inspection Data Entry** window; the most recent inspection will be the currently selected one.

Edit inspections window

Past inspections listing

Create a new inspection

Distress ID	Date	Total Samples	Surface Type	Comments
01 AL	7/23/1996	14	AAC	
02 BU	11/17/1994	14	AAC	
03 BU	10/12/1993	14	AAC	
04 BU	10/16/1992	14	AAC	
05 CO	10/16/1991	4	AAC	
	9/1/1990		AAC	Inspection
	5/23/1990	14	AAC	
	6/6/1989	14	AAC	
	5/6/1987	13	AAC	
	10/13/1986	13	AAC	
	9/28/1985	13	AAC	
	5/14/1980	13	AAC	

Similarly, if you want to enter comments for an inspection date, click on the **Insp. Date – Comments** box and enter a comment (text string), which is stored with that inspection date. To check the comments on any given date, make the date current in the date window and click the **Insp. Date – Comments** box to view the contents.

PAVER uses sampling techniques for performing inspections. While you can inspect each section in its entirety, it is not practical to do so. It is acceptable to inspect only portions of a section. To use this technique, each section is divided into smaller pieces called sample units. Inspection information is collected from one or more sample units.

The PAVER **Inspection Data Entry** window matches the field inspection, and allows you to enter your survey information. Click the **Edit** button, next to the **Sample** window, to bring up the **Select Samples** window. The **Select Samples** window contains two lists. The left side shows the samples to be included in this inspection. The right side shows samples that were used in previous inspections. To use a sample defined in a previous inspection, click on the sample and then click the arrow button located between the two lists.

To add a completely new sample, click the **Add New** button. A sample is added to the end of the list with the **Sample Number** of “New” and a **Sample Size** of zero. Click on the **Sample Number** field and change the ID to the sample ID used in the actual field inspection. You may also enter a comment for the sample and switch the **Sample Type** between **R** (Random), and **A** (Additional).

If there is a sample definition in the left hand list that you do not wish to use, click on the sample you wish to remove, then click on the **Remove** button. If the sample already has inspection information (as can occur when editing the sample list for an existing inspection), PAVER informs you that the sample already contains information, and asks you to confirm that you really wish to delete the sample and any inspection information within the sample.

## Entering Inspection Information

### Note

You may enter duplicate distress type/severities. For example:

Alligator L 50  
Alligator L 40

The PAVER **Inspection Data Entry** window is designed to be easy to use, while allowing experienced users to rapidly enter large amounts of inspection data. Once you learn the basic operations and become familiar with the window, it is possible to enter all the inspection information for an entire section using only the keyboard.

Once the section is selected and the inspection date and samples are set up, you are ready to enter the individual distresses. Click on the distress code and description, then click the desired distress **Severity** level, then click the **Quantity** field and type in the distress quantity. Note that the distress codes available in the list depend on the type of pavement you are inspecting, since some distresses are only found on a particular surface. Similarly, when you choose a distress code, PAVER modifies the available severity levels since some distresses cannot be assigned a severity level.

After you have entered the **Distress**, **Severity**, and **Quantity**, click the **Add** button to add the distress to the list. Similarly, if you want to delete an existing distress from the list, highlight a row by clicking on it and click the **Delete** button. The **Replace** button deletes the highlighted record and replaces that information with the current **Distress/Severity/Quantity** information. If you wish to enter a comment for the distress, click on the **Section Comments** button in the list of distresses.

Once you have entered inspection data for an entire sample, proceed to the next sample in the list by choosing another sample from the **Sample** drop-down box. You may also review previously entered data by using the **Sample** drop-down box.

Distress codes and descriptions

Severity level

Quantity field

Distress summary for a sample unit

Distress	Description	Severity	Quantity	Units	Comments
1	ALLIGATOR	L	6	SqFt	
1	ALLIGATOR	M	30	SqFt	
4	BUMPS/SAGS	L	20	Ft	
7	EDGE	L	142	Ft	
7	EDGE	M	15	Ft	

## For Maximum Speed - Keyboard Only

The most repetitive part of inspection data entry is inputting the distress data. Once familiar with the PAVER **Inspection Data Entry** window, distress data entry can be performed totally on the keyboard.

To perform keyboard-only data entry, first set up the inspection and sample information as described in the previous section. All distress codes are two-digit numbers, and are shown to the left of the distress descriptions. To enter “Bleeding”, for example, type the two-digit code “02.” A rectangle appears around the code and description. You may change the distress selected by typing a different code, or by moving the selection rectangle with the arrow keys.

Select the proper **Severity** by typing “L” for **Low**, “M” for **Medium**, and “H” for **High**. Once you type a severity code, the cursor immediately moves to the **Quantity** field where you can type in the distress quantity. Note that the entire **Quantity** field is highlighted, meaning that anything in the box is immediately overwritten by what you type. If the distress has no severity level, then the **Low**, **Medium**, and **High** options are disabled (gray). To skip the severity, press the Tab key twice. The cursor skips first to the N/A option, then to the **Quantity** field.

Once you have typed in a quantity, add the distress to the list by typing “A” for **Add**, or by pressing the Enter key. PAVER creates a new row in the list of distresses and signals you with a short beep or click sound to let you know the data has been entered.

To enter a comment, you need to use the mouse to click on the **Comments** field in the list of distresses entered and type in the comment. When finished, click on the next distress code and resume keyboard-only entry.

When you are finished entering all the distresses for a sample, move to the next sample by typing “N” for **Next**, or move to a previous sample by typing “P” for **Previous**.

## Batch Inspection Data Entry

In order to expedite inspection data entry, you may enter multiple inspection records at one time. For video inspection data, it must be in a specified format. There are two options for video inspection data imports. One option requires six ASCII text files. The other option requires at least one of five tables in an Microsoft Access database. For specific format requirements, see **Appendix B**. After data is in the correct format and all files or tables are complete, begin the batch entry by selecting the option from the PAVER **Add-Ins** menu.

## Calculating the PCI after Inspection

Within the **Inspection Data Entry** window, PAVER allows the user to view the condition of an individual section immediately after distress data is entered. To access this feature, click the **Calculate Conditions** button in the **Inspection Data Entry** window. The section properties are all displayed at the top of the window. In the middle of the window, Condition **Index**, Inspection **Date**, and **Condition Value** are all displayed. This window also gives you basic information about the section that you are viewing. This is a description of the information available by tab:

- **All Indices** – This tab displays the **Condition Value** for all conditions associated with the current section.
- **Individual Distresses** – This tab displays distress information for every distress entry in every sample of the current inspection date. Added to the information is the density of that distress and the corresponding deduct value.
- **Extrapolated Distresses** – This table shows each distress type (all identical distress type and severity levels from the previous tab are grouped together here) with the quantities adjusted to reflect the extrapolated value. With random samples, PAVER extrapolates the distress quantity across the entire section.
- **Sample/Distress Summaries** – The left side of this tab displays the number of samples surveyed and compares the total number of samples to the recommended number for a project level inspection. The right side of this tab groups all recorded distressed by type and calculates the corresponding percentages.
- **Sample Info** – General data about each sample involved in the inspection is included here.

Again, right clicking any table provides **Print** and **Export** options. There is also a **Print** button at the bottom of the window.

---

## Other Conditions

### User-Editable Condition Indices

PAVER computes the value of the PCI (and all PCI related distresses defined in **System Tables/Condition Types/User Defined Distress Indices**). You may input all other condition index values in this table. The value can be accessed and utilized in other areas of the program, but the input is manual. Click on the field next to the condition index you would like to use (in the **Value** column) and type the data in directly. To add, remove, or edit the list of indices, click on the **Select Indices** button. This activates the same table viewed when **Condition Type Selection** is selected via **Visual Menu...System Tables...Condition Types** (see **System Tables** under **Condition Types**). The **Inspection Date Comment** button allows you to view the comments entered for this inspection date.

---

# Inspection Data Import (PAVER Database)

## Copying Inspection Data

PAVER allows you to copy inspection data from one version of a database to another copy of the same database by using the **Inspection Data Import**. This can be useful when it is desired to copy the inspection information that was entered in one database to another similar database. To get started, click on **Inspection Data Import (PAVER Database)**. This is located on the **Visual Menu** under **Inspection**.

A Windows dialog box appears on the screen asking for the database file from which you wish to copy the inspection information. Once you have located the correct database file, a PAVER box appears and asks which inspection dates you wish to copy to the online PAVER database. Select the appropriate dates from the list, click OK, and the inspection data is imported.

# Inspection Schedule

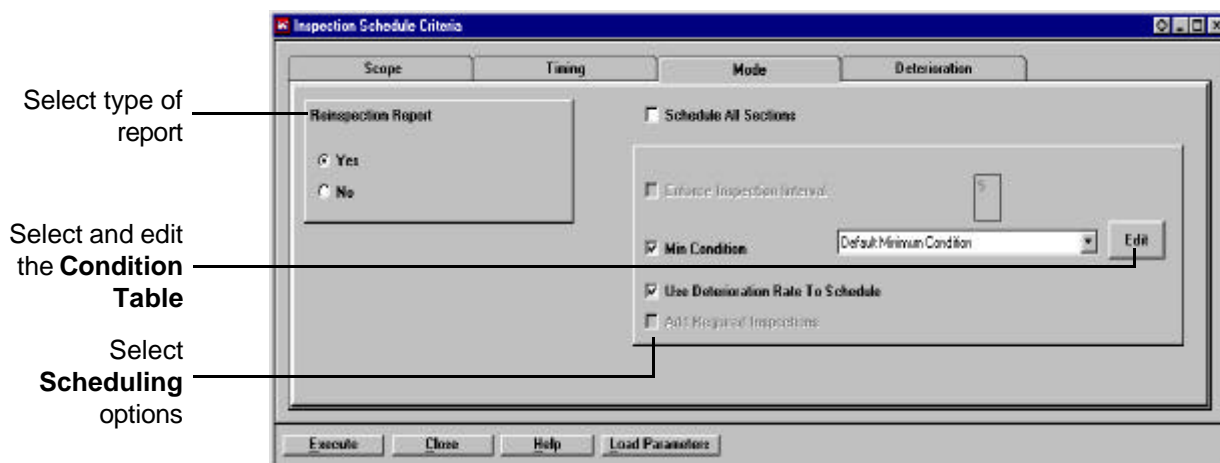
---

## Inspection Schedule Report

The **Inspection Schedule** report selects sections for inspection subject to minimum condition criteria or projected deterioration rates. The **Inspection Schedule** report operates like the **Condition Analysis** report and the **M&R Work Plan** report. When the report is opened, you may configure the parameters to be used with the report and then execute the report. The completed report is presented in the **Report Viewer**.

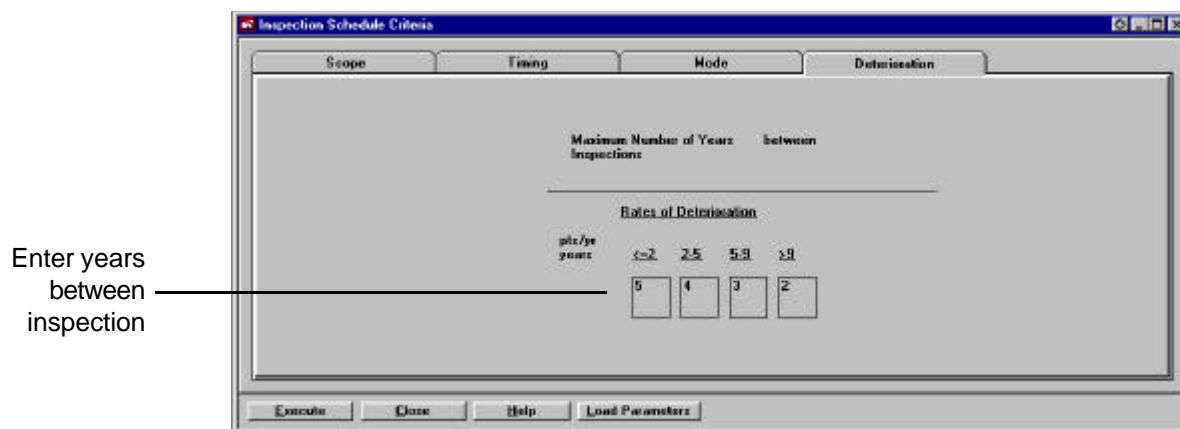
Start the **Inspection Schedule** report from the **Visual Menu** by selecting **Inspection Schedule** and then **Inspection Schedule Report** from the sub-menu. Select the sections to include in the report with the **EMS Query Tool** on the **Scope** tab. **All** can be selected to include all the sections in the active database, or select **Selected Items - Edit Selection** and use the **EMS Query Tool** to build a subset of sections. The **Timing** tab is used to specify the scheduling period.

The **Mode** tab is used to configure the method for selecting pavement sections to inspect. Select the **Schedule All Sections** to specify a complete inspection. Use the check boxes to enable or disable the **Min Condition** and **Use Deterioration Rate To Schedule** options. These options may be run together or separately. A third element for the report is to generate a **Re-Inspection Report**. The **Re-inspection Report** option is turned on or off by using the **Yes/No** selector buttons, selecting “Yes” generates a re-inspection report along with the inspection schedule (A description of the **Re-inspection Report** is included in the **Reports** section).



You may choose to schedule inspections according to a table of minimum acceptable conditions, if desired. If the **Min Condition** box is checked, projected section conditions are compared to a list of minimum conditions, and a section is only scheduled for inspection if that section's condition falls below the matching record in the minimum condition table. When the **Min Condition** alternative is selected, you may specify a minimum condition table. Use the drop-down box immediately to the right of the **Min Condition** check box to select a table of acceptable minimum conditions. The **Edit** button can be used to review the selected minimum condition table. If the table is viewed, a list appears separated by **Branch Use**, **Section Rank**, and **Year**. For each row, there is an associated minimum condition. The table of minimum conditions can be viewed and edited from here.

If the **Use Deterioration Rate To Schedule** box is checked, the table on the **Deterioration** tab allows you to configure the relationship between deterioration and inspection frequency. PAVER checks the rate of deterioration for a section included in the report and categorizes it based on the numbers placed in each rates of deterioration category.



Run the **Inspection Schedule Report** by clicking the **Execute** button. The **Inspection Schedule Report** is presented in the **Report Viewer** with the default view as a summary of inspections per year. To obtain a version of the report that lists the individual sections inspected for each year of the report period, click on **Go to Detail**. When closing the report, PAVER will ask you if you want to save it. If you respond “Yes”, it creates a file name of your choice (with an “RPI” extension).

## Open Saved Report

This is the utility that allows you to open an RPI file – a saved inspection schedule. Simply search to the directory where you saved the RPI, double click the file name, and it opens in the same view as when you originally created it.

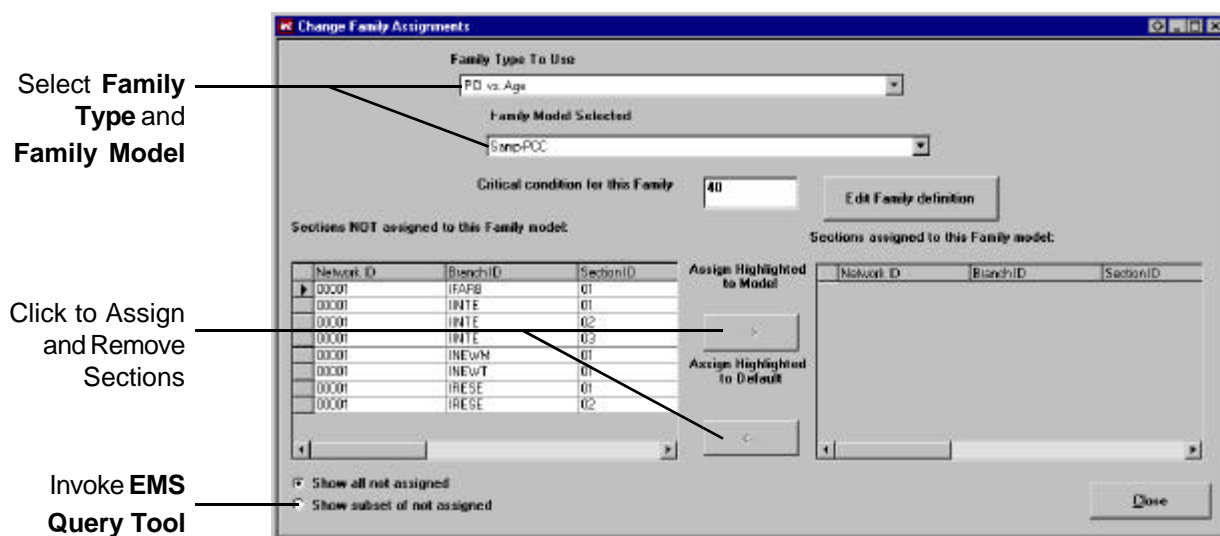


# Family Assignment

## Change Family Assignments

Family assignments can be made when a section is defined in the Inventory module, or when a family model is created in the Prediction Model portion of the program. However, if you want to change a family assignment or rapidly assign families to sections, the **Change Family Assignments** routine provides an efficient routine for reviewing or adjusting family assignments. Some definitions for clarification include the following:

- **Family:** A group of pavement sections with similar deterioration characteristics.
- **Family Model:** The plot of observed age and condition measurements for pavements with similar attributes.
- **Family Type:** A pairing of a condition type and an event (such as age), for the purpose of plotting data points.
- **Family Assignment:** The process of assigning a **Family Model** to a section for use by the condition prediction engine.



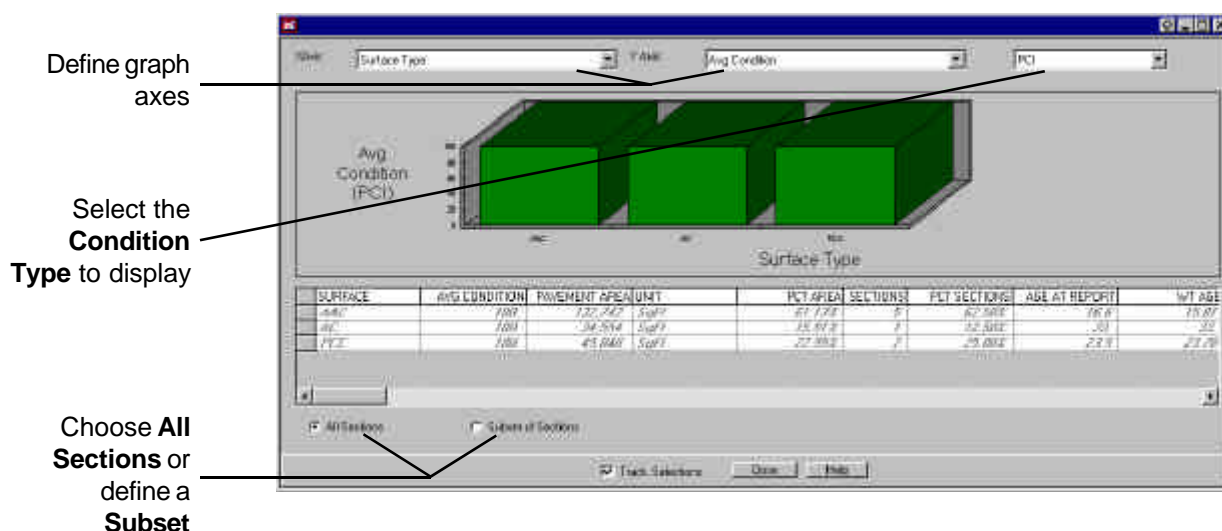
**Change Family Assignments** is accessed through the **Prediction Model** selection on the **Visual Menu**. After selecting a particular **Family Type** and **Family Model** from the drop down lists, PAVER displays all sections in the active database grouped into two categories: sections assigned to the current model and sections not assigned to the current model. The **Family Type** listings available in this menu are internal to PAVER and cannot be changed. The **Family Model** options, however, come from the **Prediction Model** and are user created. PAVER comes with a set of sample models.

To assign or unassign a section, highlight a section (or group of sections) and use the arrow buttons to move the section(s) into the appropriate category. You can view a subset of sections at one time by using the **Show subset of not assigned** radio button. Clicking on this button invokes the **EMS Query Tool**. From this point, you can design a query (i.e. Surface Type = PCC) and use that to assign all sections in the query to the current **Family Model**. To edit the subset, click on the **Define Subset** button to invoke the EMS Query tool.

# Reports

## Summary Charts

**Summary Charts** is a feature designed to allow you to graph, and compare any two attributes of a database. For example, you can view the average condition of your network based on surface type. To access the **Inventory Summary Charts**, select the **Visual Menu** button from the **PAVER Button Bar** and choose **Reports** and then **Summary Charts**. At this point, the **Summary Charts** window appears and awaits your selection of a category to represent the X and Y axis. Using the drop-down boxes labeled **X Axis** and **Y Axis**, select an **X Axis** for the graph you wish to produce. The drop-down box for **Y Axis** selections is hidden until you make your selection for the X axis. The third drop-down box requests that you make a selection of which condition index you wish to use. Remember, for the charts to work properly, you must have condition data available for the index you have selected. PAVER automatically associates a PCI with every section in your database. Every other index requires that you either input the value manually or establish a definition for the index (discussed in detail under **User-Defined Indices**).



After you have made valid selections (some combinations may produce a null set of sections and hence no graph), the graph and data table below populate. For the table at the bottom of the page, dragging the border with the mouse can modify the field widths. A right mouse click on the table Produces the **Print**, **Export**, and other options for the table.

# Standard Reports

There are four **Standard Reports**: **Branch Listing**, **Work History**, **Branch Condition**, and **Section Condition Reports**. These reports are accessed through the **Visual Menu** via the **Reports** option.

A brief description of each of the four **Standard Reports** is as follows:

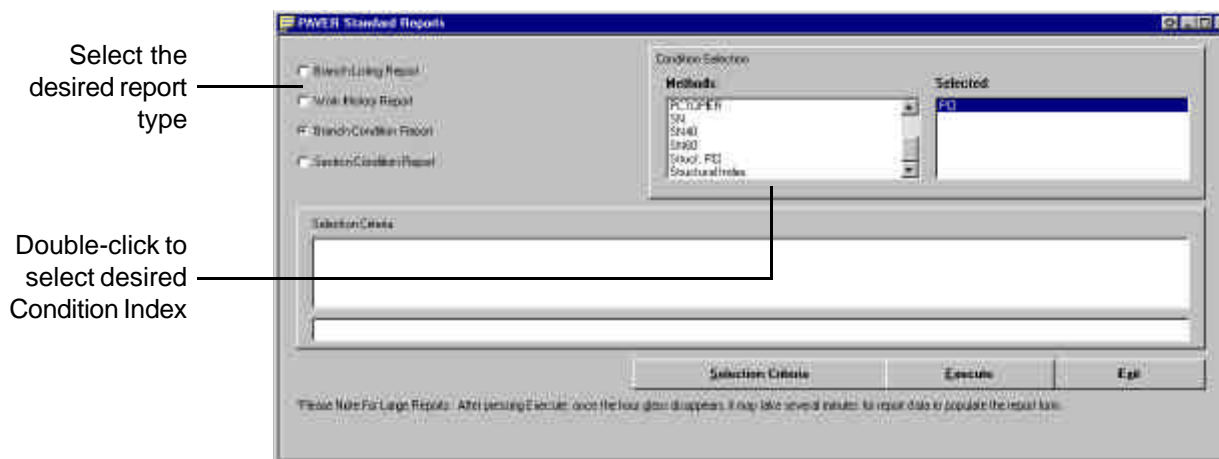
- **Branch Listing Report** – This report produces a list of all branches and relevant information on each including usage, number of sections, total area, etc. The last page is a summary of all branches in the network (or networks).
- **Work History Report** – This produces a section by section report of all work completed within that section over the life of the database. Data such as work type, work date, and cost are included.
- **Branch Condition Report** – This is a display of the average and weighted average condition of each branch. Standard deviations are included, and a summary of all branches is included on the last page.
- **Section Condition Report** – This is the same as the branch condition report only the data is displayed at the section level. Again, a summary is included on the last page.

## Note

For **Standard Reports** there is no **Order Rows** tab in the **EMS Query Tool** since reports are created in a standard layout.

The starting point for each of these reports is the same. Define the subset of the database you wish to run the report on by clicking on the **Selection Criteria** button. The subset can range from one section to the entire database which is the default if you do not establish **Selection Criteria**. Clicking on the **Selection Criteria** button opens the **EMS Query Tool**. Use of the **EMS Query Tool** has been discussed in previous sections.

When running the **Branch** and **Section Condition Reports**, one additional piece of information is required. Before the report can be executed, you must select which condition index is to be used. This is done by double-clicking on the desired condition in the **Condition Selection** box under **Methods**. This places that condition type in the **Selected** window, at which point you can proceed with the query or execution of the report. To deselect an item in the **Selected** box, double-click on it to send it back to the **Methods** box. Only one condition index can be used per report.



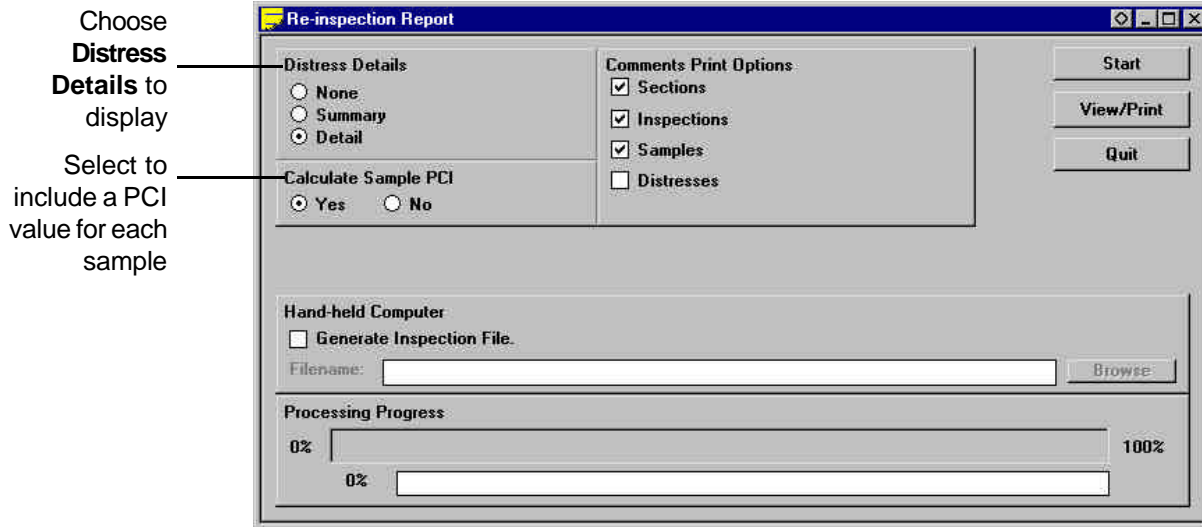
On the top of each of the reports is a tool bar, used to manipulate the report. Left and right arrow buttons are used to go forward and backward through the report. In between the arrows is a display of the current page and the total number of pages in the report. There is a print button and an export button to send the report to a printer or to a file for further manipulation. Finally, a **View Size** drop-down box allows you to size the report for ease of viewing.

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## Re-Inspection Report

The **Re-Inspection report** is designed to produce a listing of information about the last inspection for each section included in the report. The **Re-Inspection** window offers several options for configuring the report:

- **Distress Details** – This section gives you the option to display recorded distress information from the last inspection in three levels of detail (Remember: distresses are entered at the sample level and are associated with a specific inspection date.):
  - **None** – No distress details shown.
  - **Summary** – Distress code and severity level of each distress in the sample unit are shown.
  - **Detail** – Complete details for every distress listed in the current sample are shown.
- **Calculate Sample PCI** – This produces a PCI for each sample listed. Although Paver works with Section level PCI's throughout the program, this shows the PCI of each inspected sample.
- **Report Sample Ordering** – This gives you control over how the re-inspection report sorts and orders the samples in each section – numerically or alphanumerically. Your choice is based on how you have chosen to name your samples.
- **Comments Print Options** – Checking any combination of these boxes enables the report to display comments that were entered at that level. Within the program, you can enter comments in a text field, at any of those levels – here is where those comments can be printed out.
- **Hand-Held Computer** – Selecting this option creates a file (extension INP) that can be downloaded to a handheld device for use during the inspection process. This file provides the handheld unit with all information necessary to perform an inspection on a section. To use this feature, select the **Generate Inspection File** box and type the path and name of the file you wish to create (using the INP extension). You can also click on **Browse** and point to the folder you will be storing the inspection file in. You still need to name the file – making sure to add the .INP extension in the name, and click **Open** to place the path and file name in the **File name** box. From here, you will run the re-inspection report as usual and Paver creates the INP file and places it in the path you specified, when the re-inspection report is finished.



Now that you have configured your report, clicking the **Start** button creates the report. The next thing you see is the **EMS Query Tool**. At this point, you can select the whole database, or specific sections to be included into the report. When you say **OK** to the **Query Tool** (Saying **OK** to an empty query selects the entire database) the re-inspection report executes. When the progress bar indicates that the report is complete, clicking on **View/Print** displays the report. From this screen, you can view the contents, print the report, or export to a file or application. If you want to change any of the report parameters, simply close the view window, make the appropriate changes on the configuration screen, and select the **Restart** button.

## User-Defined Report

The user-defined reporting tool gives you the ability to create your own report. The results of the report are displayed in table form that can then be printed or exported to another application (such as Microsoft Excel). As with other tables in PAVER, right click on the table to access the print and export options menu.

Opening the user-defined reporting tool produces the **EMS User-Defined Reporting Tool** window that offers three options: display a **Memorized Report**, **Create New Report**, and **Edit Current Report**.

### Display a Memorized Report

This is a report that you have created and saved. It is available from the pick list at the top of the window. This report regenerates each time you select it, so all information displayed is current.

## Create New Report

Click on the **Create New Report** button and the **EMS User-Defined Reporting Tool Definition** window appears. On the left side of the definition window, there is a tree that reflects your database structure. On the right side, there is a window with three tabs. Use the tree in the left side of the window to select a component of the hierarchy that contains the data elements that you would like displayed in your report. All associated elements are displayed in the left window of the **Select Columns** tab. You can scroll through the various levels of the tree in the left side of the window to see exactly which elements are associated with the different levels of the inventory structure.

### Note

**Selected Rows** determines which records will be included in the table, while **Selected Columns** determines what data from each record is displayed.

In the right side, the first tab, **Select Columns**, requires you to specify the data items that are displayed in each column. Select individual components and move them to the window on the right side. All elements in this window become the column headers for your report. Only the elements you select from the center window and move to the right side are integrated into the report.

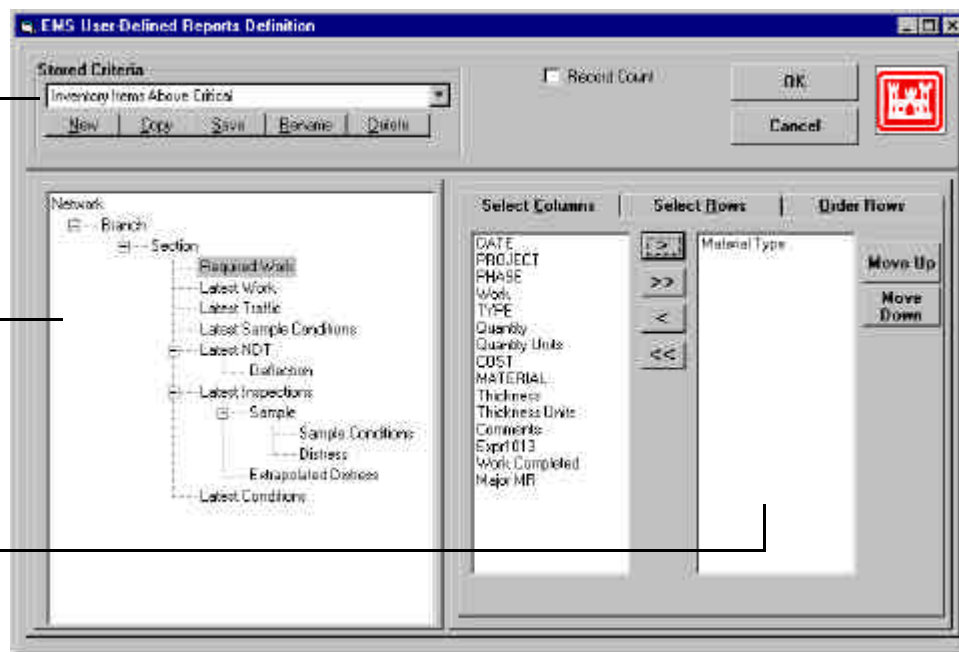
**Select Rows** invokes the **EMS Query Tool** and allows you to build the selection as you would in any other case that the **Query Tool** is used. Finally, the **Order Rows** tab allows you to order or sort the records in the table.

In between the two windows of the **Selected Columns** tab and the **Order Rows** tab, there are two types of arrows. Double arrows move all items in the window, and single arrows only move the selected item. If you choose to deselect an item, simply move it back to the center box, and it is removed from the list. The **Move Up** and **Move Down** buttons allow you to position the selected components in the desired order. The **Change Order** button, in the **Order Rows** tab, changes between Ascending and Descending orders for the selected components.

Store criteria to be used again as a **Memorized Report** format

Navigate through inventory components for data categories

Columns to be included in the report must be shown here



The **New**, **Copy**, **Save**, **Edit**, and **Delete** buttons, located in the top left of the window, become available to perform the corresponding actions as the circumstances allow. Previously saved formats are listed in the **Stored Criteria** drop down list.

## Edit Current Report

The first step to editing a report is to select the desired report from the drop-down box at the top of the **Edit** window. From here, all of the same options from **Create New Report** are available. When the editing is complete, the changes take effect immediately and are reflected the next time the report is run.

To **Run** a report, simply select the report from the drop list at the **EMS User-Defined Reporting Tool** window, and the populated table appears. The report generates at the moment of selection so all data is current.

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## GIS Reports

The **GIS Reports** are a series of preset views that allow you to see a variety of information about your database in a graphical display. They are only available if you have a map linked to your database (see the GIS section for details on linking). The views are grouped into 2 sections: **Last PCI** and **General Info**.

To navigate these views, use the **GIS Viewer Buttons**. They function in the following manner:

- **Center** – Centers the current view at full extent
- **Pan** – Allows you to move around the view at the current zoom level
- **Select** – Activates the selector tool so you can use the GIS view as an inventory selector (See the section on “Selectors”)
- **Zoom Area** – Allows you to block portion of the view to zoom in on
- **Zoom In** – Zooms in one level on the entire view
- **Zoom Out** – Zooms out one level on the entire view
- **Print** – Prints a copy of the view and the categories with color codes

### Last PCI

This view displays the current/latest PCI value for each section in the view. This PCI value comes from the last inspection date (or last major M&R activity date). Going to **Tables** from the menu bar, and selecting **Condition Tools** and **Define Condition and Age Categories** can define the categories and values, as well as associated graph colors. In this table, on the **Condition Categories** tab, select **PCI** in the **Name** drop-down box, and you can make new categories, change names, assign numeric ranges, and manipulate color schemes.



## General Info

Unlike the **Last PCI** view, **General Info** actually consists of four separate views:

- **Surface Type**
- **Category**
- **Rank**
- **Branch Use**

The categories and associated color schemes in these views are preset and cannot be changed. Since the **General Info** window has four views, only the *top, checked* view will be displayed. Each view name has a check box next to it. If only one box is checked, then only that view displays. If more than one view is checked, the view that is highest in location on the list displays. The up and down arrows under the views box can be used to move views up or down on the list. Highlight a view and use the arrows to move it to a different location on the list.

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# Prediction Model

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## Create and Maintain Prediction Models

### Building Family Models

The essence of the prediction modeling (family modeling) process is to identify and group pavements of similar construction that are subjected to similar traffic patterns, weather, and other factors that affect pavement life. The historical data on pavement condition can be used to build a model that can accurately predict the future performance of a group of pavements that possess similar attributes. This model of pavement life is assigned a name, and in the PAVER vocabulary it is referred to as a "family."

Each pavement section in PAVER is assigned a family. When predictions about the future performance of a pavement are desired, a section's family assignment is used to predict a section's future condition. If the user has not assigned a family model to a section, PAVER will use its default family to predict future pavement performance.

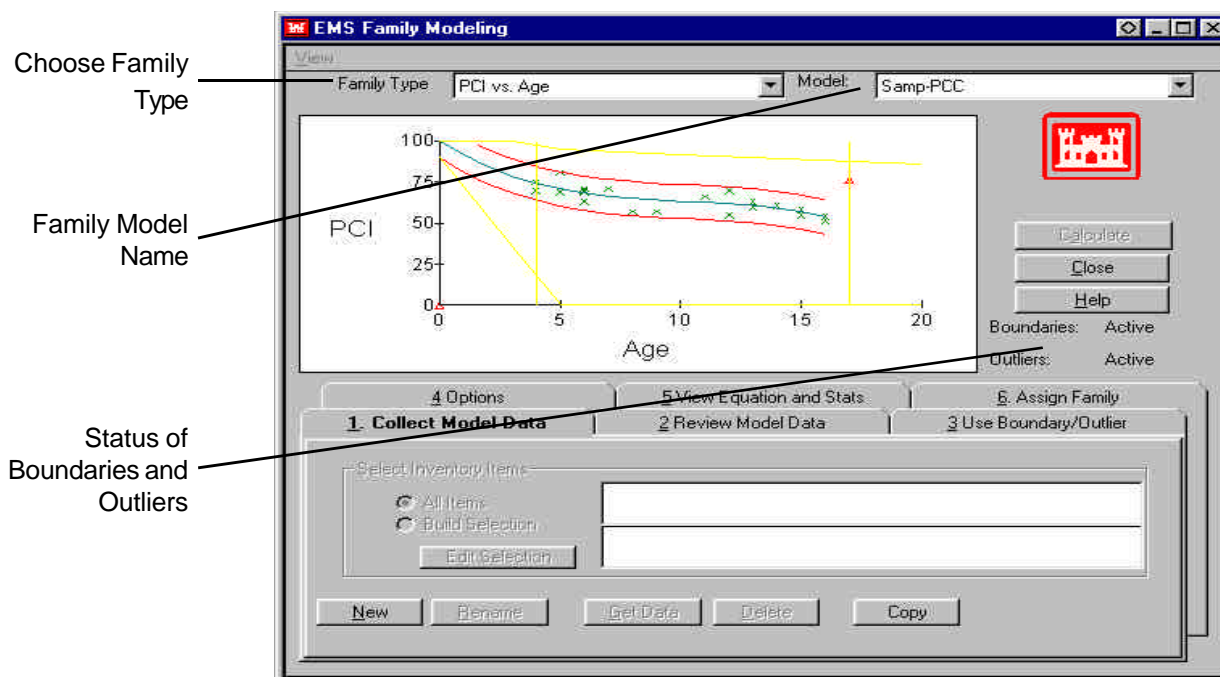
However, factors such as original construction, maintenance, weather, and traffic, greatly affect the life of a pavement and a generic guess, one of which is the default family, is not likely to be as accurate as a model that takes these factors into consideration. The **Prediction Model** is designed to allow users to blend unique knowledge about their pavements, measured local condition information, and powerful modeling tools together to produce highly accurate estimates of future pavement life.

#### **Note**

When selecting a model, scroll and type seek capabilities are available if the number of saved models exceeds the length of the list.

### Using the Prediction Model

Click on the **Pred. Modeling** button on the PAVER button bar. The **Prediction Model** can also be reached via the **Visual Menu**. A window titled "EMS Family Modeling" appears. The top half of the form is a graph that shows a sample start-up prediction model. Two drop-down boxes are located above the prediction model graph. By clicking the arrow on the right side of these boxes, you can select a **Family Type** and a saved prediction model. Select a model from the list. When you select a model, PAVER loads all the data points used to build the model and the settings used to generate the model. It then plots the data points and the estimated condition prediction function.



The upper right corner of the **EMS Family Modeling** form contains three buttons: **Calculate**, **Close**, and **Help**. The **Calculate** button causes the model to estimate the condition prediction function and plot the curve through the data points. The **Close** button closes the **EMS Family Modeling** window. Any models you have built are automatically saved when the **Close** button is clicked. "Help" is launched by clicking the **Help** button. The prediction model plot operates like other PAVER graphs. A right click on the graph displays the extended graphing features menu.

Located just below the **Help** button are the **Boundary** and **Outliers** status indicators. Once a model is selected or created, the **Boundary** and **Outliers** status indicators are activated. These indicators report the status of the boundary data filter located on card **3. Use Boundary/Outlier**, and the statistical outlier analysis feature that is configured on card **4. Options**. These options, and all other family model building variables, are configured on the index card style data entry forms located on the lower half of the **EMS Family Modeling** form.

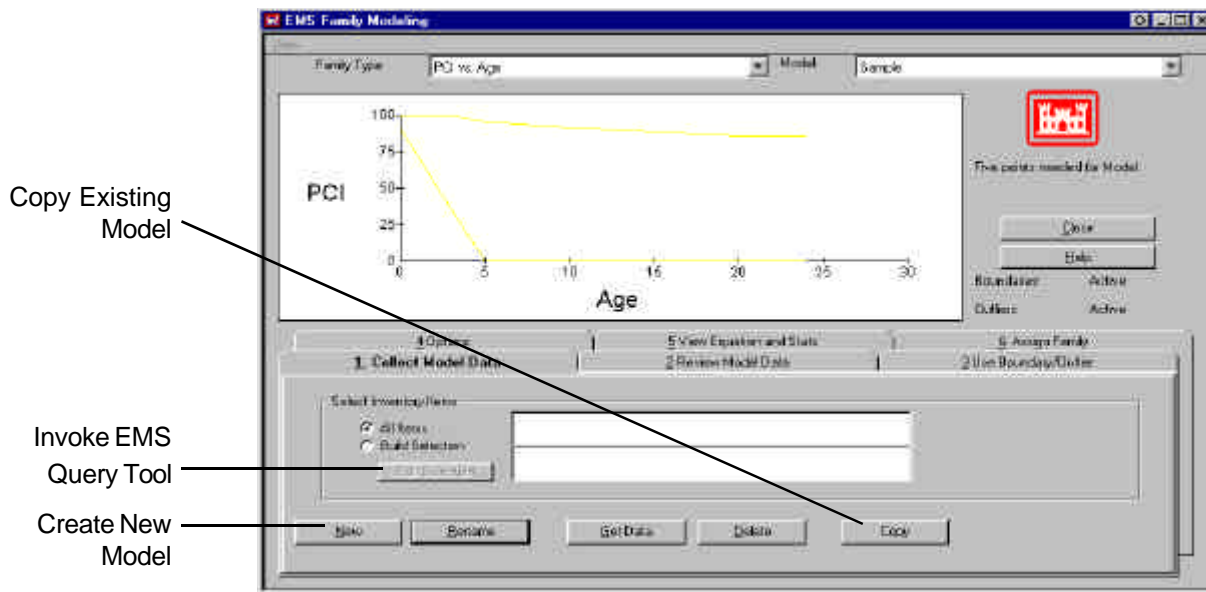
## Collect Model Data

### Note

When a prediction model is created, only data points that are at least one year old are used.

This form is used to collect data from the active PAVER database and in order to build a new family model or to adjust an existing family model. To create a new model, click the **New** button. You are prompted to provide a name for the new family model being created (entries may be up to 16 characters in length). After naming your family model and clicking **OK** on the **Create New Model** form, the **EMS Query Tool** is presented so that you may select a subset if desired of the active database. After selecting the filter criteria (which can be none), the age verses condition points for the pavement sections selected are placed in the grid on the **Review Model Data** card as well as displayed on the graph.

The **Get Data** button at the bottom of the **Collect Model Data** card is used to modify the data used in an existing family model. After you click the **Get Data** button, you are prompted to overwrite the existing model data, append to (add to) the existing data, or abort the get data operation. The **Copy** button creates a new model based on the family model that was active when the **Copy** button was clicked. You are prompted to provide a name for the new model. Clicking the **Delete** button causes the active model to be deleted.



#### Note

Points can be added to the **Review Model Data** table in order to influence the model curve. When entering data you need only enter Age and PCI values.

## Review Model Data

This card presents data used to create the family model. Like other tables in PAVER, the extended features can be accessed by right-clicking on the table. The **Status** column contains no entry for records that are used to calculate the condition prediction curve. Points that are removed from the prediction process by boundary conditions or outlier analysis are labeled as “Out of Range” or “Outlier” points. You can add points to this table if you wish to influence the curve in a particular area. If any records are added or deleted, you must recalculate to refresh the graph.

## Use Boundary/Outlier

#### Note

In order to edit **Use Boundary/Outlier** or **Collect Model Data** tabs, make sure the check box next **Prevent Changes to Model** in the **Options** tab is unchecked.

Upper and lower model boundaries are specified on the **Use Boundary/Outlier** card. Age vs. PCI points that fall outside the boundaries are marked as “Out of Range” in the **Review Model Data** table and are not considered when the predicted condition function is estimated. Points marked as “Out of Range” can be reintroduced into the analysis by turning off the boundaries or shifting the location of the boundaries so those points are in the allowable range. The **X Range Filter** is used to specify a range on the x-axis from which you want to include data. Data points outside the range you specify are ignored.

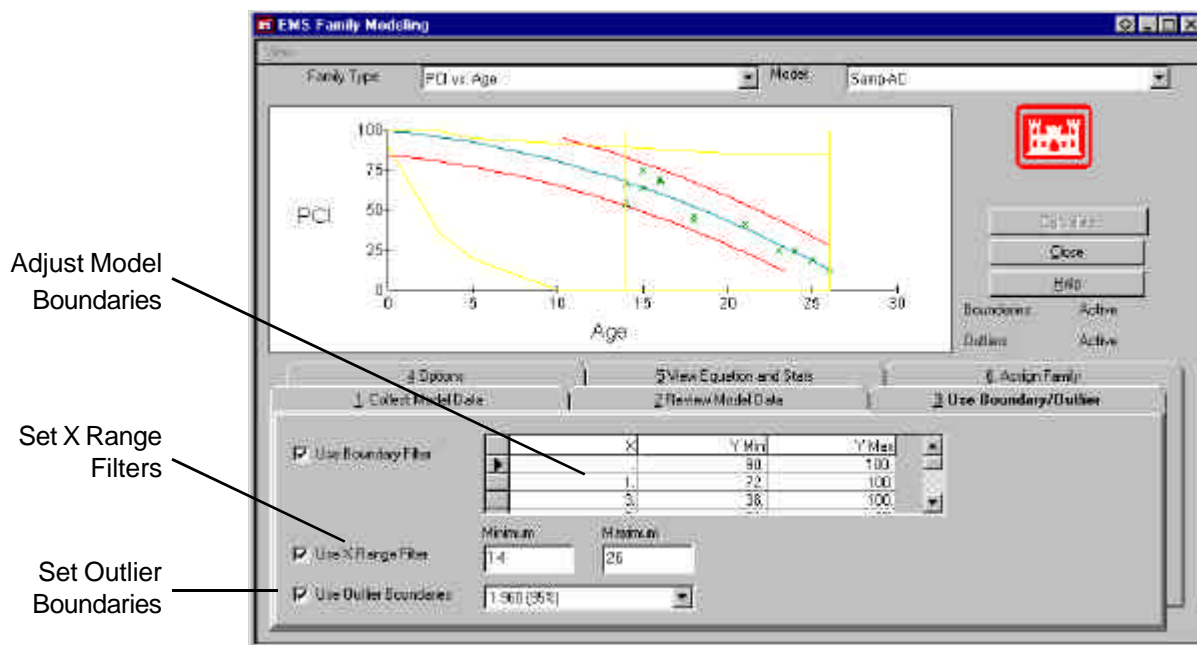
Model boundaries are adjusted by changing the values in the table on the **Use Boundary/Outlier** card. To edit or change a value, highlight the row in the table you want to change. Then, select the column you wish to edit (year, lower or upper bound) and type the new value (numeric entries only).

### Note

To add or delete rows of boundary data, right click on the table.

New rows can also be added to the table with the right click menu. The **Add** option inserts a blank row in the last row of the boundary data table. Records in the boundary data table are sorted in ascending order by age (year). Edited and new records are out of order until the model is recalculated. You can force a recalculation of the model by activating any of the other index cards and then clicking the **Calculate** button. After the model is recalculated, the boundary table entries will be in proper sort order.

You can also set **X Range Filters** - minimum and maximum. Finally, the outlier boundaries are used to limit the number of data points used in the computation of the curve. Options for outlier constraints range from 50 to 100 percent. Changing these various options and recalculating produces different curve results. Use tab **5. View Equation and Stats** to determine the statistical soundness of your curve.



## Options

The **Options** card is the heart of the statistical analysis performed in the prediction modeling tool. In the "Slope" section, you can choose to constrain the curve upward or downward, or leave it unconstrained. You also set the critical PCI for all sections assigned to this model by entering the value you wish in the "Critical Condition" window. To prevent changes to the model select the check box associated with the label **Prevent Changes to the Model**.

## View Equation and Stats

The **View Equations and Stats** card displays the intercept and coefficient values for the equation estimated to be the best fit for the data. The card also lists various "goodness-of-fit" statistics for the estimated model.

## Assign Family

Once a new family model has been completed, the **Assign Family** card can be used to assign the active family model to the pavement sections that were used to create the model. When you select the **Assign Family** card, the program checks the contents of **Review Model Data** card to build a list of the sections used to estimate the current family model. When you select the **Assign Family** card, the program first checks whether any sections in the current database are assigned to the selected **Family Model**. If the **Family Model** is not assigned to any sections, a message comes up indicating both that there are currently no sections assigned this model and asking whether you would like to assign the sections used to build the model (i.e. sections that fit the selection criteria on the **Collect Model Data** card). You may choose to assign these sections to the current family or continue without assigning the family to the sections.

Once the **Assign Family** card is active, the card contains a table and two buttons. The table lists the pavement sections in your database that are assigned the current family model. The two buttons arrayed on the card below the **Assign Family** table, **Add Members to Family** and **Remove Current Members**, are used to edit the pavement sections assigned to the current family model. To drop a section from the current family, highlight the section in family assignment table and click **Remove Current Member**. The section that is dropped is assigned the default family. The **Add Members to Family** button launches the same process as the **Edit Selection** routine on the **Collect Model Data** card. When you click the **Add Members to Family** button, the **EMS Query Tool** appears. You can use the **EMS Query Tool** to identify the sections you would like to assign the active family model to. When you have completed the query, the selected sections are added to the **Assign Family** table.

## Other Condition Prediction Model Features

When the **Prediction Model** is open, a **View** menu appears at the top of the window. This option allows you to turn on and off various graphing features including **Boundaries**, **Outliers**, **Good Points**, and **Bad Points**. These features only affect the view of the data, not the underlying statistical routines. For example, if you use the view menu to turn off the boundaries, the boundaries do not appear on the plot of the graph. However, points in the model that do not meet the boundary conditions are still excluded from the modeling process.

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# Condition Analysis

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## Condition Analysis Report

### Overview

The **Condition Analysis** feature allows you to view the condition of your pavement network, or any subset of the network you specify. The analysis is based on prior inspection data, interpolated values between previous inspections, and projected conditions based on family assignment. Once you specify the pavements that you would like to analyze and duration of time to be used, PAVER can predict the deterioration of your pavements. The **Condition Analysis** tool is invoked by clicking on the **Condition Analysis** button on the button bar or by going to the **Visual Menu** and selecting **Condition Analysis**, then selecting **Condition Analysis Report** from the sub-menu, and clicking on the **Continue** button. The **Condition Analysis** parameter collection window appears on the screen.

### Configuring the Condition Analysis Report

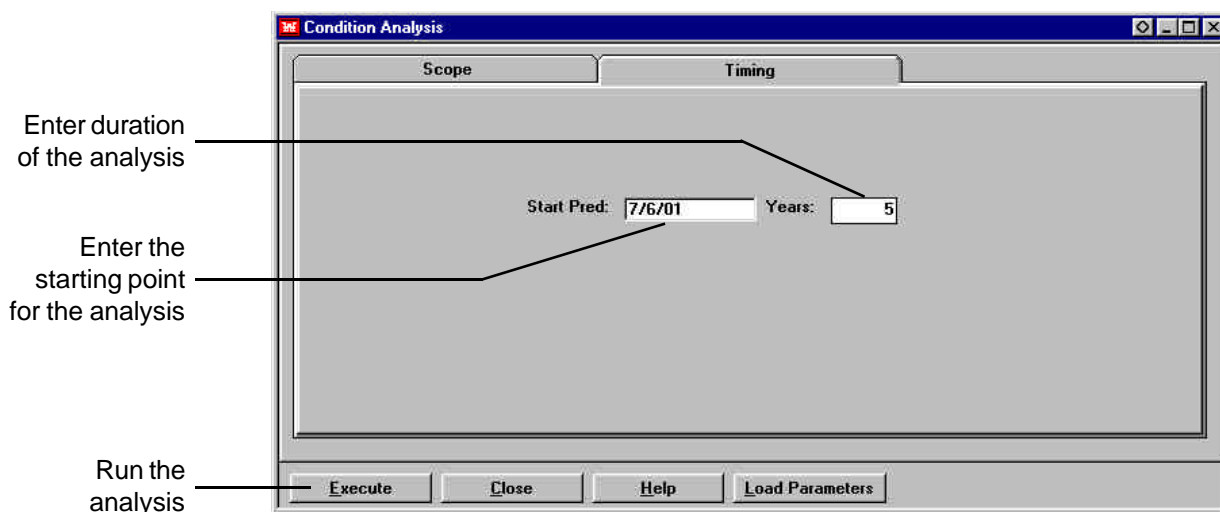
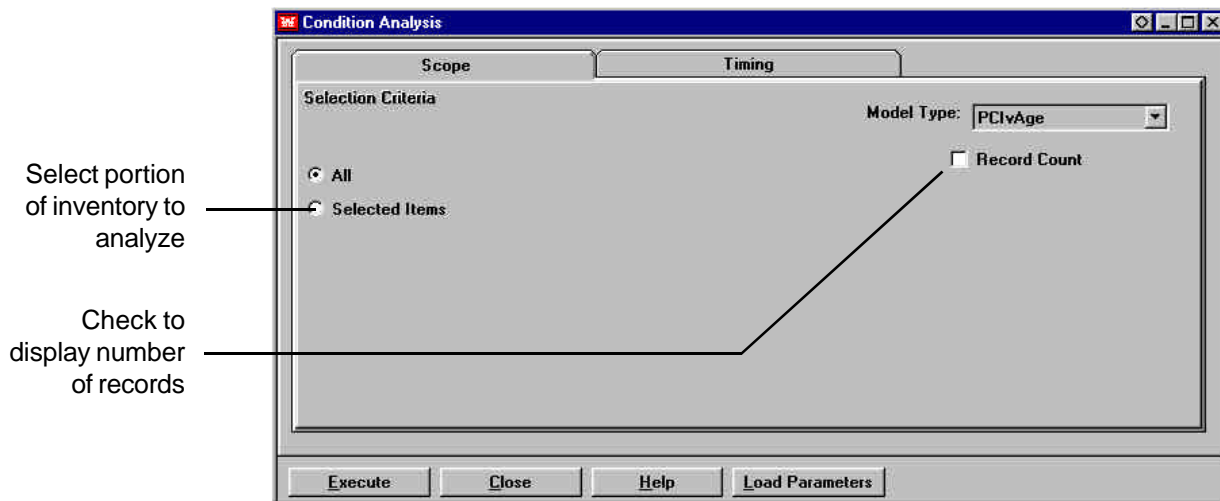
#### Note

You can select a **Start Date** to show past condition.

When the **Condition Analysis** is selected, a window with two file cards appears. On the **Scope** card, the **Family Type** choices are **PCI v Age** or **IRI v Age**. At the left, two options are available for selecting inventory items to be reported: **All** and **Selected Items**. The default is set to **All**. Choose **Selected Items** to prompt the **EMS Query Tool** to select a subset or records for the report. After selections are made, the selection criteria is shown in the previously empty white box. The **Record Count** box shows the number of sections included in the current plan.

Behind the **Scope** card is the **Timing** card. Enter the desired date to start the prediction model in the box next to **Start Pred:**. Then, enter the number of **Years** to report. The report includes historical information and predicted condition for selected sections for each year for the selected number of years.

You can use previously saved report parameters using the **Load Parameters** button at the bottom of screen. A dialog box asks from where to load the report. **Condition Analysis** report files typically carry the extension "RPC." After loading the report parameters, you may change them as needed, then run the report.



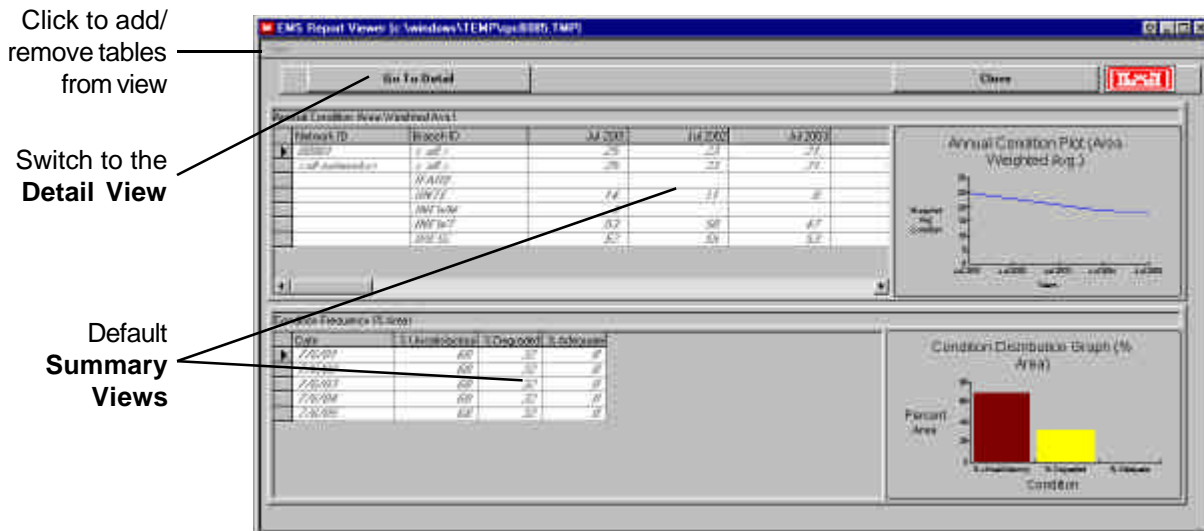
## Analyzing Pavements

Once you have configured the report, click the **Execute** button to start calculating the report. When the report calculations are completed, the **Condition Analysis Report** is presented in the **Report Viewer** tool. The default presentation of the report is a summary of conditions that includes two tables with corresponding graphs. The summary view includes the **Annual Condition (Arithmetic Average)** table that shows the average condition for each branch, for each year in the reporting period. The first row of the condition summary table is the average condition of all branches included in the report. The condition summary table is accompanied by a graph that plots the average condition for the highlighted branch (row) in the condition summary table.

The second view is the **Condition Frequency (% Area)** table and associated graph. The condition distribution table presents a histogram for each year of the specified reporting period with sections grouped into seven PCI categories (excellent, very good, good, fair, poor, very poor, and failed). The condition distribution graph presents a histogram for the highlighted year in the condition distribution table.

The **View** menu in the **EMS Report Viewer** can be used to add or remove tables and associated graphs from the report viewer screen or to switch between the summary and detail version of the report. To turn off one of the summary tables and its associated graph, select **View > Summary** and then select the table that you want to turn off. Tables and graphs that are active in the current report view have a check mark to the left of the table or graph name.

As usual, in order to zoom on a table or graph, right click on the desired object and select zoom. Other options can be selected with a right click such as: **Revise Layout**, **Change Sort Order**, **Export** and **Print Table**.



## Other Views

The detail version of the **Condition Analysis** report default presentation includes the **Section Condition** table and its associated graph as well as the **Inventory Items** table. The **Section Condition** table is linked (as the dependent table) to the **Inventory Items** table (parent table).

### Note

Data shown in the **Summary View** is branch level data while data shown in the **Detail View** is section level data.

A powerful feature of the **Condition Analysis Report** is demonstrated by selecting the **Inventory Items** table and then stepping down the **Inventory Items** table slowly one row at a time. Each row in the **Inventory Items** table represents one section in your pavement network. As you change the highlighted row in the **Inventory Items** table, the **Section Condition** table updates with historical, interpolated historical, and projected condition values for that section. Each time the **Section Condition** table is updated, the graph associated with the table replots the graphical view of the section condition. With this powerful tool you can quickly analyze the history and predicted condition of your network section by section.

The detail version also allows you to overlay the **Section Condition** plot with family curve and/or the **Work History** plot. These features are turned on and off with under **View > Detail** in the **EMS Report Viewer** window. Overlaying a family curve shows how the current view is performing in comparison to a particular family model. Overlaying a work plan shows the difference between the predicted decline of a pavement (or set of pavements), and the effects your work plan scenario. The **Section Work History** view (also linked to **Inventory Items**) produces a list of all information in the work

history table - by section. Similarly, the **Inventory Work History** view displays ALL work history records for every item in the current database. The **Section Condition List** is a representation of the condition plot - for each section - for the term of the condition analysis. Highlighting a record in the table causes the graph to respond, displaying the condition information for that section only. To see an average for all sections included in the report, go back to the summary views.

In addition to the **EMS Report Viewer**, the **Condition Analysis Report** also opens a "Select GIS Views" window. This window contains a preset view linked to the results of the current Condition Analysis report. The name of the view is "Section Conditions by Year" and can be viewed by double clicking on the GIS tree selector in this window. The resulting display is a year-by-year view of the conditions of each section included in the condition analysis. This GIS view is an excellent tool to quickly show the difference in condition from year to year.

Click to add/remove tables from view

Switch to the Summary View

Highlighted Section and Corresponding Condition Plot

Network ID	Branch ID	Section ID	Branch Use	Section Rank	Surface	Branch Area	Branch Width	Name
00001	IFARB	01	ROADWAY	1	ACC	64.7367	5.0gft	055A
00001	INTE	01	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	02	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	03	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	04	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	05	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	06	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	07	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	08	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	09	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	10	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	11	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	12	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	13	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	14	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	15	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	16	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	17	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	18	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	19	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	20	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	21	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	22	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	23	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	24	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	25	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	26	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	27	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	28	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	29	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	30	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	31	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	32	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	33	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	34	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	35	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	36	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	37	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	38	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	39	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	40	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	41	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	42	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	43	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	44	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	45	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	46	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	47	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	48	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	49	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	50	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	51	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	52	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	53	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	54	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	55	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	56	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	57	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	58	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	59	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	60	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	61	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	62	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	63	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	64	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	65	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	66	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	67	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	68	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	69	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	70	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	71	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	72	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	73	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	74	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	75	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	76	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	77	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	78	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	79	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	80	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	81	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	82	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	83	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	84	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	85	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	86	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	87	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	88	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	89	ROADWAY	3	ACC	62.2386	5.0gft	055A
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00001	INTE	91	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	92	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	93	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	94	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	95	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	96	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	97	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	98	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	99	ROADWAY	3	ACC	62.2386	5.0gft	055A
00001	INTE	100	ROADWAY	3	ACC	62.2386	5.0gft	055A

Section Condition Plot

Condition

Probability

## Open Saved Report

If desired, a previously saved report can also be viewed without "rerunning" (i.e. without PAVER recalculating and searching the database for changes). This can save considerable time for long reports. Selecting the **Open Saved Report** option opens the Windows file search tool that looks specifically for any file with the ".RPC" extension. Highlighting an RPC file and choosing **Open** brings up the **Condition Analysis** report and you can work with it as you would any other **Condition Analysis** report.

# M&R

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## M&R Plan

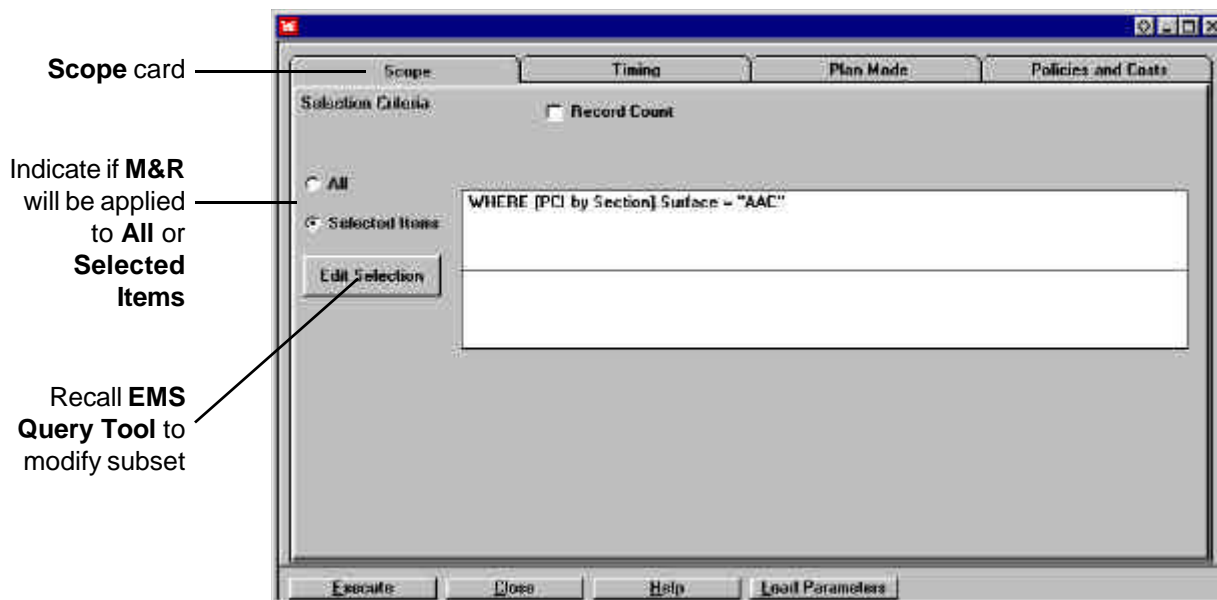
### Configuring the M&R Report

The PAVER **Work Plan** is a tool for planning, scheduling, budgeting and analyzing alternative pavement maintenance and repair (M&R) activities. The M&R plan utilizes basic inventory data combined with inspection information, maintenance policies, maintenance costs, and predictions about future pavement condition. **Work Plan** results are specific to your site. All factors used in determining future M&R or construction activity or the associated costs can be configured to reflect your pavement management practices and costs.

The **Work Plan** report operates like the **Condition Analysis** report. When you start the report, a four tab parameter collection window appears on the screen. When the **Work Plan** report is configured, you execute the report and view the results in the **Report Viewer**.

### Tab 1 - Scope

The **Work Plan** parameters are configured through the **M&R Plan** module on the PAVER button bar. The **Work Plan** configuration window uses an index card style form with the **Scope** card appearing first. The **Work Plan** report can be applied to all the sections in your database or you may specify a subset of records. To analyze all sections in your database, use your mouse to select **All**. To analyze a subset of your pavement sections, click on **Selected Items**. The **EMS Query Tool** is launched immediately for you to indicate the subset of pavements that you would like to use. When you specify the **Selected Items** option, a new button, **Edit Selection**, appears on the **Scope** card. If you wish to edit your selection later, clicking this button invokes the **EMS Query Tool** for you to update your selection. As always, the **Record Count** check box shows the current section count based on the specific query you are working with.



## Tab 2 - Timing

### Note

Selecting the **Consequence Model** option on the **Plan Mode** tab automatically forces the **Years** value on the Timing tab to "1".

The Timing card is used to specify the start date and number of years the plan will encompass. Entering the **Start Year** for the **Work Plan** and the number of **Years** to analyze specifies report duration. The **Start Year** field must be entered in mm/dd/yyyy format. **Years** is simply a numeric value with 1 as the minimum.

## Tab 3 - Plan Mode

Three variations of the **Work Plan** can be used. The first, **Critical PCI Method**, optimizes M&R activity against a specified budget or determines the budget needed to maintain a specified condition level. The second, **Minimum Condition**, measures costs but rations M&R by pavement condition. The third, **Consequence Model**, measures the impact of a localized M&R action over the first year.

To select **Critical PCI Method**, highlight its radio button. Next, select the policies you wish to use in the work plan. The **Localized < Critical** option is used to indicate the use of **Safety M&R** policies. The **Localized < Critical** is used to indicate the use of **Preventative M&R** policies.

### Hint

You can create a budget of \$100,000/Year and use the Budget multiplier feature in the **M&R Work Plan**.

Below the maintenance policies are the **Determine Budget Consequence** option and the **Determine Budget Requirements (Iteration)** option. Selecting **Determine Budget Consequence** optimizes M&R activity against a specific budget. The drop-down box next to **Budget** is used to specify one of the PAVER M&R budget tables to use with the report. The **Edit** button is used for reviewing and editing the selected budget table or for creating a new table. **Major M&R Priority** lets you set the hierarchy for determining which pavement type and which condition range gets repaired first. To edit or add a new priority table, select the **Edit** button. See **System Tables** for further instructions on creating or editing **Budget** or **Major M&R Priority** tables.

### Note

M&R tables are also accessed through the PAVER Menu. Under the **Tables** menu, select **M&R Plan Tables**.

Selecting **Determine Budget Requirements** (Iteration) allows you to choose between **Backlog elimination in  $x$  years** or **Condition Stabilization**. Note that  $x$  changes as the work plan duration is changed in the **Timing** tab in **Backlog elimination in  $x$  years**. When **Condition Stabilization** is chosen, two more options appear. You must specify either **Maintain Current Area Weighted PCI** or **Reach Preferred Area Weighted PCI**. Finally, specify the maximum number of iterations that PAVER uses to calculate the goal.

The **Minimum Condition** option lets you set the lowest pavement condition (PCI) that is allowed for each pavement rank (**P** - Primary, **S** - Secondary, **T** - Tertiary, etc.). To edit or add a new **Minimum Condition** table, see [System Tables](#).

The **Consequence Model** calculates the cost and resulting condition of immediate implementation of local M&R for the year of the most recent inspection. Note that choosing **Consequence Model** changes the work plan duration in the **Timing** tab to one year automatically.

Select desired  
M&R policies

Select budget  
options

Select **Budget**  
and **Priority**  
tables

The screenshot shows the 'Policies and Costs' tab in the PAVER software. The 'Critical PCI Method' section is active, with 'Localized < Critical' and 'Localized > Critical' checked. The 'Determine Budget Consequence' section is selected, showing 'Budget' as 'Unlimited by Year' and 'Budget Scale Factor' as '1.0'. The 'Major M&R Priority' is set to 'Default Priority Table'. The 'Minimum Condition' and 'Consequence Model' options are also visible.

**Minimum  
Condition**  
option

Select and Edit  
**Minimum  
Condition**  
tables

The screenshot shows the 'Policies and Costs' tab in the PAVER software. The 'Minimum Condition' option is selected, showing a 'Minimum Condition' dropdown menu set to 'Default Minimum Condition' with an 'Edit' button next to it.



## Tab 4 - Policies and Costs

**Work Plan** maintenance policies and work costs are configured on the **Policies and Costs** card. Notice that if the maintenance policies below **Critical PCI Method** were chosen on the Plan Mode tab, the same policies are active on this tab.

The drop-down boxes, positioned by the **Localized** repair options, are used to select the maintenance policy to apply for **Policy < Critical** and **Policy > Critical M&R**. Associated with each maintenance policy is a cost table. You may accept the default selection or specify a custom cost table. The maintenance policies and cost tables are defined in data tables that can be created or edited by clicking on the **Edit** button that corresponds to the table you are working with, or through the **Tables** selection on the PAVER Menu. Distress repair work quantities in Micro PAVER are calculated using the table in Appendix H.

Different global maintenance work types can be specified for minimal, climate related, and skid causing types of distresses. The pick lists associated with the three global maintenance labels show the available global repair options and the **Interval** (policy application interval), **Delta** (improvement in the condition as measured by years until condition returns to the current state), and **Cost** (per unit of pavement) associated with each repair option. You may select "none" from the list if you do not wish to perform one or more of the three types of global maintenance.

To edit the global maintenance lists, again click on the corresponding **Edit** button or choose **Tables>M&R Plan Tables>Global M&R** from the PAVER Menu. PAVER will display the information to be edited using the **Tab Table** editor. There are two tables of information used to describe global M&R work. These two tables are **Work Types** and **Cost**. To change existing work type description information, simply click on the work type information field desired, and enter the new information. Similarly, to change existing cost information, select the tab for **Cost**, then select the desired **Cost** table using the drop-down box at the top of the **Cost** card, and edit the information directly on the grid. Several different **Cost** tables may be used in PAVER, even for the same work items. This is because costs may vary depending on whether they are done in-house or by contract, as part of a small job or part of a very large one, for example.

To add new **Global M&R** table information, you must first understand the relationship between the tables used for **Global M&R** work. The **Work Types** card is the master table. In order for cost information to be entered, there must first be a **Work Type** entry. **Cost** information can be entered for any of the work types in the **Work Types** table. Often, cost information will be added only for those work types which you expect to use in your **Work Plan**. When you choose to add a record in the **Cost** table, you are asked to choose an existing work type from a list of **Work Types** already defined. Therefore, if you add a new work type description to the **Work Types** table and then go to the **Cost** table and choose to add a new cost item (using the **Add** button), you will see that your new work type is now on the list of **Work Types** available to add cost information.

In addition to adding work type descriptions to the **Work Types** table, and cost information to an existing **Cost** table, you may also create new named **Cost** tables using the **Add Table** button on the **Cost** card. When you first create a new **Cost** table, it will be empty, without any information on any work types. Use the **Add** button on the **Cost** card to



create new records (i.e. rows of cost information) for any work types you desire in your new **Cost** table.

Major M&R is performed on sections, which have structural distresses at the time of the last inspection. Major M&R is generally only performed on sections with a PCI below the critical PCI or sections that will fail prematurely due to design or construction deficiencies. A different start date option is provided for Major M&R to accommodate design preparation or seasonal delays.

**Note**

You may create multiple **M&R Cost by Condition** tables.

The cost of Major M&R is determined by the PCI at the time the work is performed. The Cost by Condition table specifies the cost of various categories of repair, including Major M&R. To Edit the Cost by Condition tables select **Tables>M&R Plan Tables>Major M&R** from the PAVER Menu. Select the **Cost by Condition** tab from the **Major M&R** table to set the per unit cost of Major M&R. The **Cost by Condition** table used in the **Work Plan** is specified at the top of the **Maint. Policies** card on the **Work Plan** form in the **M&R Plan**.

There is an option to **Apply Policies in the First Year**. You may check this box if you would like the localized policies to be utilized in the first year of the M&R plan. Otherwise, in year two and beyond, the **M&R Cost by Condition** table selected will determine localized policies. Also, there is an option at the top of the card to apply an inflation rate. Check this box and input the desired rate.

Select Localized M&R policies and costs

Select Global M&R policies and costs

Select Start Year for Major M&R

M&R Cost by Condition (Year2..n) Default Cost by PCI Range Edit Factor: 1.0

Localized ☐ Apply Policies in First Year

Policy < Critical SAFETY M&R, ROADS (DEFAULT) Edit Default Cost by Work Type Edit Factor: 1.0

Policy > Critical PREVENTIVE, ROADS (DEFAULT) Edit Default Cost by Work Type Edit Factor: 1.0

Global Global Cost Edit Factor: 1.0

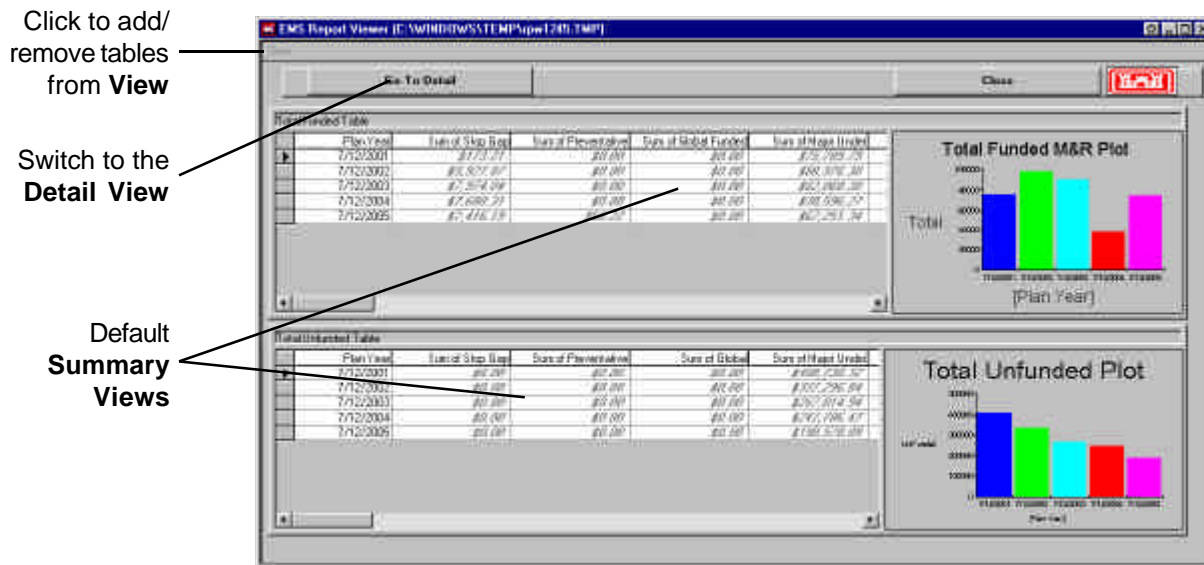
1) Minimal	No Global M & R	0	\$0.00 SqFt
2) Climate Related	Surface Seal - Fog Seal	5	\$0.05 SqFt
3) Skid Causing	Surface Treatment - Sand Tar	5	\$0.10 SqFt

Major M&R Start Year: 7/11/2001 ☐ Show Major M&R backlog in interim

Execute Close Help Load Parameters

## Analyzing M&R Activity

Once you have configured the **Work Plan** report, click the **Execute** button to start calculating the report. When the report calculations are completed, the **Work Plan** report is presented in the **Report Viewer** tool. The default presentation of the report is a summary of the **Work Plan** that includes two tables with corresponding graphs. The summary view includes the **Condition Distribution Graph** (No. of Sections), that shows a breakdown of the number of sections in each condition category - for each year of the report. The **Condition Table** is accompanied by a graph that plots the conditions over time. The other default table/graph is the **Total Funded** table. This shows the totals of funds spent for each year of the plan - broken down by work category (e.g. Localized, Global, etc.). **Additional Summary Work Plan** tables are the **Summary Table** and the **Applied Policy Summary Table**.



## Summary View Section

The **View** menu on the PAVER Menu is used to add or remove tables and their associated graphs from the report viewer screen or to switch between the **Summary** and the **Detail** version of the report. To turn off one of the **Summary** tables and their associated graphs, select **View>Summary** from the PAVER Menu, and then select the table that you want to turn off. Tables or graphs which are active in the current report view have a check mark to the left of the table or graph's name. Other summary views include:

- **Annual Condition After Repair** - This displays the condition of each branch-and the entire network (or networks if you have more than one) AFTER the recommended work has been performed.
- **Condition Table** - This view shows a "before and after" average condition of all sections included in the current plan and for each year of the plan.
- **Total Funded / Total Unfunded** - These tables show how much money was spent (**Funded**) and how much PAVER wanted to spend, but did not have the funds (**Unfunded**). Unfunded work is also referred to as "Backlog".

- **Summary by Section** - This view shows a combination of things seen in other views, the condition of each section before and after work is performed, the type of work needed, and the cost involved.
- **Applied Policy Summary** - This is a breakdown, in summary form, of each **Maintenance Policy**, corresponding work description, and associated work quantities, and costs.

## Detail View Section

### Note

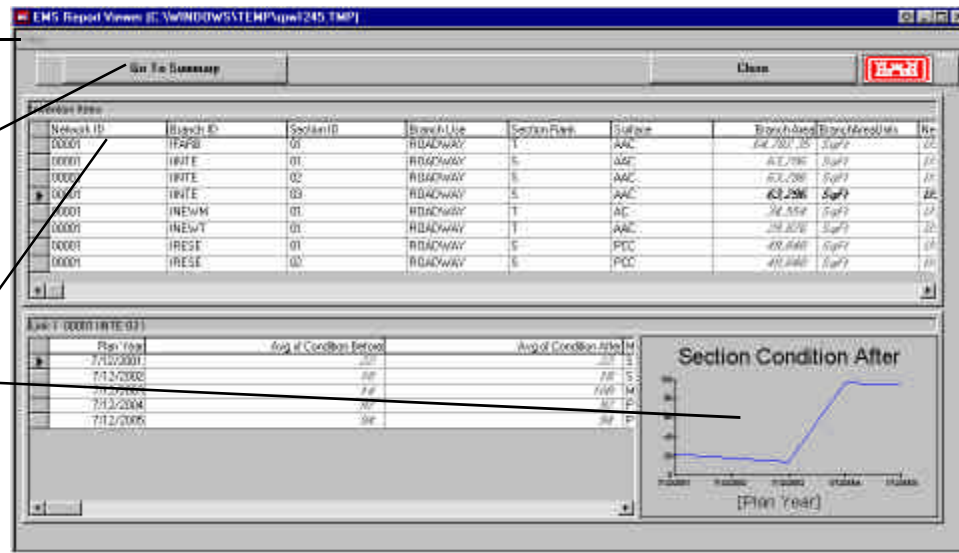
Data shown in the **Summary View** is branch level data while data shown in the **Detail View** is section level data.

The **Detail (View>Detail)** version of the **Work Plan** includes the **Detail** table, **Applied Policy Details** table, **Inventory Items** table, **Missing Values** table, and a table listing the parameter settings used in the report. If the **Consequence Model** was requested, an additional table titled **Applied Policy Consequences** is included in the **Detail** report. Some table definitions include the following:

- **Detail Table** - A breakdown - by section - of the amount of money spent in each work category, and before and after conditions.
  - **Policy Action Details** - A list of distresses encountered (from the last inspection date for each section) and work applied.
  - **Detail Table by Section** - This is the Same as **Detail Table**, but it includes an associated graph displaying condition.
- As with the **Condition Analysis Report**, the **M&R Report** also produces a "Select GIS Views" window that allows you to view three separate, preset GIS views associated with the current M&R Report. The preset views are:
- **"After" condition by Year** - This shows the condition of each section in the report "after" the funding (work) has been applied to that section.
  - **All planned M&R by year** - show a breakdown - by year - of what types of work need to be done (according to the M&R plan) on each section.
  - **Major Planned M&R by year** - same as above, concentrating only on the Major M&R work. Split into two categories: Above Critical (for sections above the critical PCI) and Below Critical (for sections below critical).

Reminder: GIS views are only available if you have linked a coverage to your database (See the chapter on GIS).

Highlighted  
**Section** and  
Corresponding  
**Condition Plot**



As with the **Condition Analysis** reports, you can also save any M & R plan that you run. Again, a primary advantage of doing this is saving the time it takes to execute the report. Depending on the speed of the computer and the parameters of the report and the size of the database, this could be significant. It also provides an easy quick way to compare different reports.

# Add-Ins

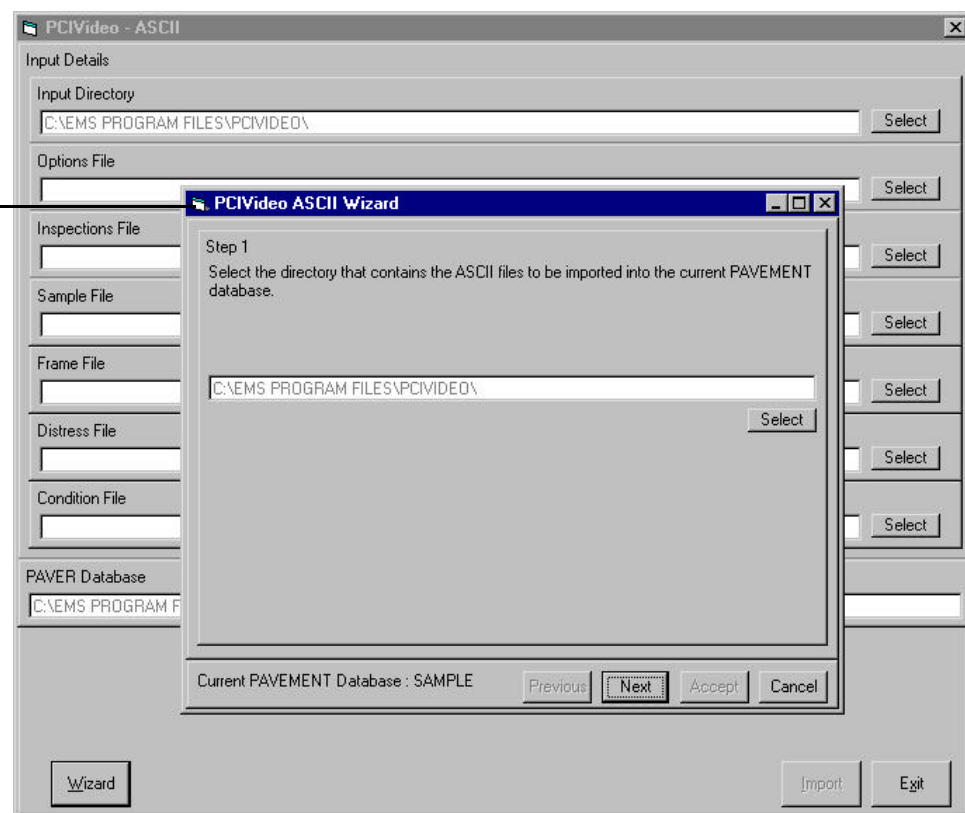
## Condition Data Import (ASCII)

The **Condition Data Import (ASCII)** feature allows you to import data into PAVER using ASCII file format. Upon launching the feature, a file wizard is opened to help guide PAVER towards the appropriate data files. For examples of how to format files for ASCII Video Inspection Import see [Appendix B-1](#).

The ASCII Condition Data Import wizard helps guide PAVER to the correct files

### Note

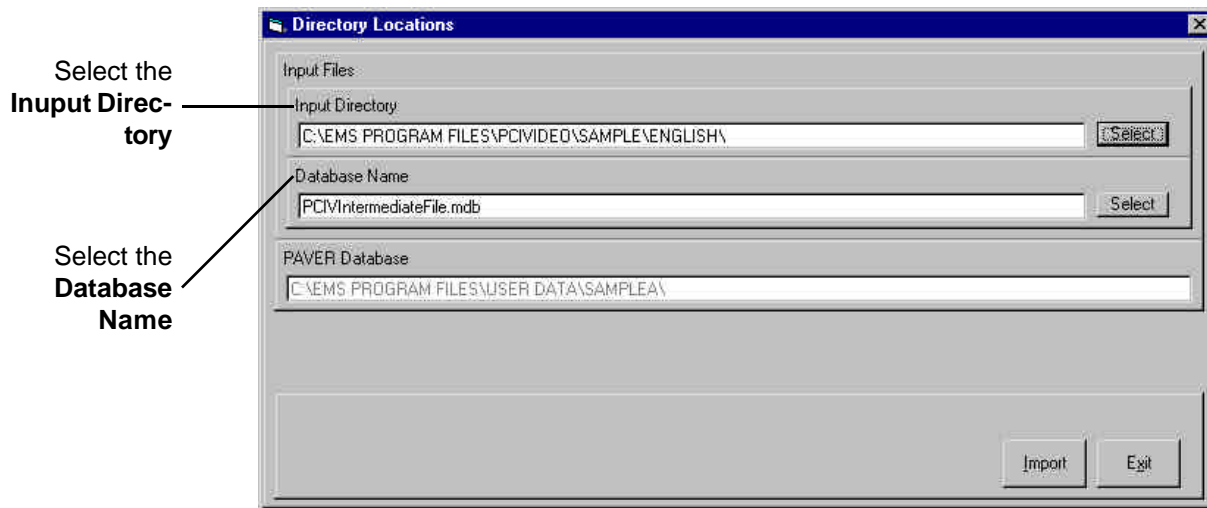
You can either use the wizard to locate the files, or locate the files one by one without the wizard.



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## Condition Data Import (Database)

The **Condition Data Import (Database)** feature allows you to import data into PAVER using .mdb file format. Locate the database file that you wish to import by first selecting the **Input Directory** and then selecting the **Database Name**. For more information on video inspection import data format for Access Databases see [Appendix B-2](#).



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## Handheld Data Import

### Micro PAVER Inspection Data Entry Using a Windows CE Handheld Device

#### Hardware/Software Requirements

For the installation of the **Handheld PCI Inspector** program, a handheld device with the Windows CE operating system and Microsoft Pocket Access is required. In addition, Microsoft Active Sync must be installed on the computer (herein referred to as “main computer”) that inspection information will be downloaded from and uploaded to. Additionally, PAVER must be installed on the main computer.

#### Software Installation

First, install Microsoft Active Sync on the main computer. Microsoft Active Sync is a free program that can be downloaded from [www.microsoft.com](http://www.microsoft.com). Second, link the handheld device to the main computer by connecting the two via serial port or USB port and launch Microsoft Active Sync. When prompted by Microsoft Active Sync to setup a partnership with this computer select “No”.

*Note: A partnership is used when the synchronizing of files on the handheld and PC are desired—this is not necessary for this Micro PAVER application.*

To install the necessary software to the handheld device, select the install file from the handheld installation CD.

## Basic Software Operation

### Process Overview

In an effort to expedite the Pavement Condition Index (PCI) field inspection process, PAVER has the added capability of interacting with Windows CE, handheld devices. This capability was developed as an “add-in” to PAVER and currently ships with Micro PAVER 5.1.

**Handheld Data Import** is accessed in PAVER through the **Add-Ins** menu. Data for field inspections can be downloaded from Micro PAVER to a Windows CE, handheld device that has the **Handheld PCI Inspector** program installed.

Typically when preparing for a field inspection, the first step is to download the sections to be inspected to the Windows CE, handheld device. Data transfer between the main computer and the Windows CE device is facilitated with Microsoft Active Sync. With Microsoft Active Sync, sections to be inspected may be transferred from the main computer to the Windows CE, handheld device using the **Download Sections to Inspect** tab available through the Micro PAVER **Add-Ins** menu. Once the appropriate sections are transferred to the handheld device, the handheld device is ready for use in the field.

After the inspection has been completed, the data on the Windows CE, handheld device must be backed-up using the **Backup Inspection Data** tab that is accessed through the PAVER **Add-Ins** menu. The backed-up data may then immediately be imported into PAVER or imported at a later date. In order to import the data the third tab labeled **Import Backup Data into PAVER** is used. During the data import, all distress information is transferred to the appropriate Micro PAVER database on the main computer.

The **Handheld Data Import** option in the PAVER **Add-Ins** menu launches a window with three tabs that perform three different tasks. The first tab is used to **Download Sections to Inspect**. The second tab is used to **Backup Inspection Data** after an inspection has been performed. The third tab is **Import the Backup Data into PAVER**. If no device is detected by PAVER, you are only allowed to use the third tab to import previously backed data into PAVER.

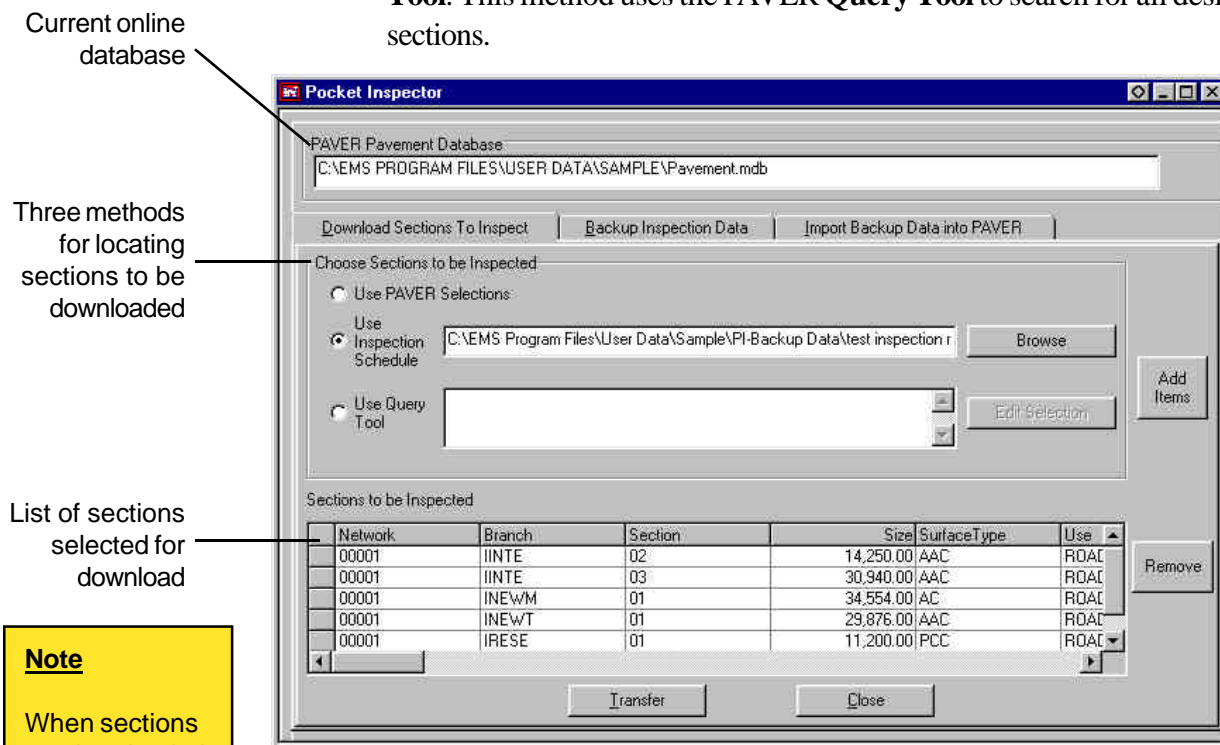


## Detailed Process

### Download Sections to Inspect

When downloading sections to inspect, the user has available three methods to select the sections to download to the handheld device.

1. The first method is to **Use PAVER Selections**. This method allows the user to select the desired sections using any of the PAVER **Selectors** such as the **Tree Selector**. Sections selected using the **Tree Selector** are automatically placed in the download queue.
2. The second way to choose the sections to download is to **Use the Inspection Schedule**. This method allows the user to choose sections based upon their inspection schedule. Based on the Inspection Schedule selected, PAVER automatically selects the appropriate sections to inspect.
3. The final method to choose the sections to download is to **Use the Query Tool**. This method uses the PAVER **Query Tool** to search for all desired sections.



#### Note

When sections are downloaded to the handheld device, the data on the handheld device is overwritten. Make sure that all data is backed-up prior to downloading sections.

Once the desired sections are found using the second two methods, click the **Add Items** button to move the sections into the download queue. To remove a section from the queue, just highlight the row or rows to be removed and click the **Remove** button. As soon as all the desired sections are queued, click the **Transfer** button and the sections are downloaded into the handheld program. Note: This overwrites any inspection data that is on the handheld. ***Be sure that all data from the handheld has been backed up into Micro PAVER before transferring new data to the handheld.*** Fortunately, PAVER alerts the user if data that has not been backed up is about to be overwritten.



## Inspections Using the Handheld PCI Inspector

After data has been transferred to the handheld device, field inspections may be carried out using the **Handheld PCI Inspector** program. The **Handheld PCI Inspector** program is separated into three tabs: **1. Sections**, **2. Samples/Frames**, and **3. Distresses**.

The **Sections** tab enables the user to view downloaded sections, add new sections to inspect or add comments. Downloaded and added sections appear in the large text box listed by network, branch, and section names. When adding a new section the user can edit network, branch and section names along with the use, surface, area, number of samples or frames, and age.

### **Note**

For sections downloaded from PAVER, you are only allowed to edit the number of samples or change the evaluation method from samples to frames.

The **Samples/Frames** tab allows the user to edit or add specific samples/frames. Downloaded samples/frames appear in the large text box. Unlike the **Sections Tab**, you may delete or edit any downloaded samples/frames. In addition, a sample may be declared to have no distresses by clicking the **No Distress** checkbox.

The **Distresses** tab allows the user to enter the distresses for each inspected sample/frame. The current sections and samples/frames are indicated at the top of the screen, and may be switched by clicking the left or right arrows on either side of the section or sample/frame ID. In order to add a new distress, click **New**. The distress type then can be either picked from the list of distress types or entered into the text box. Distress severities are selected from the pull down menu (if applicable) and distress quantities may be entered directly. In order to save the entered distress data, use **Save**. If a sample has no distresses, click the **No Distresses** checkbox. When working with frames, if a new frame is desired click the **New Frame** button, and a new frame is added with the same attributes as the previous frame.

The following information pertains to all three tabs. When adding a new section, sample, or distress, the user must first click **New** and then click **Save** after editing the appropriate fields. The user must also remember to select **Save** after **Editing** existing sections, samples, or distresses. Data may be entered by using the keyboard, the number keypad, or handwriting recognition for all data entry text boxes. ***Make sure that the cursor is located in the box that you wish to enter data.*** When using the number keypad, highlighted text cannot be overwritten – the user must click the **C** button to clear the text prior to entering the data. Comments may be added to any distress, sample, section, or inspection by clicking on the **Comments** button and either writing or typing the comment in the box.

### Hint

When writing comments or entering data, make sure the cursor is located in the correct box before using the pen recognition function on the handheld device.

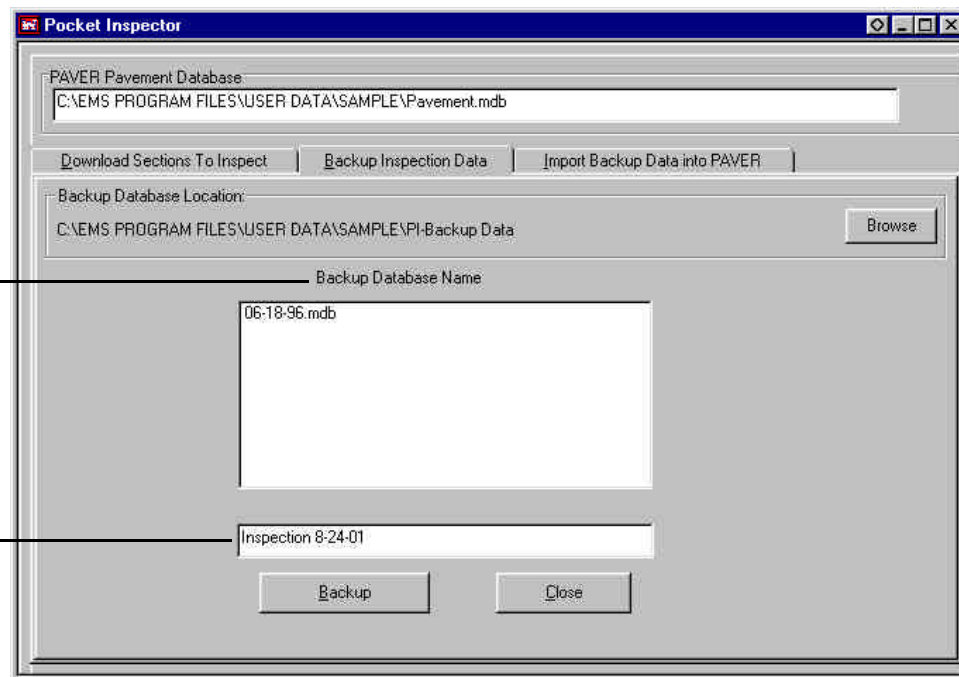
Note: When writing a comment, the user must first make sure that the cursor is located in the comment box by first tapping the comment box to make the cursor appear. Any added section, sample or distress may be deleted by clicking the **Del** button. Sections downloaded from Micro PAVER cannot be deleted. Finally, the user may calculate the PCI for a section by clicking the **Calc** button on any of the three tabs. In order to see a detailed calculation of the PCI and Structural PCI, the user may elect to see the details by clicking the **Details** checkbox before performing the calculation. The calculated PCI and Structural PCI can also be seen on the **Sections** tab after calculations have been done.

## Backup Inspection Data

Once the inspection data has been collected using the handheld device, the user must **Backup the Inspection Data** using the second tab from the **Add-Ins** menu. After connecting the handheld device to the main computer using **Microsoft Active Sync** as before, go to the **Add-Ins** menu and select **Handheld Inspector**. Using the second tab, **Backup Inspection Data**, select the appropriate file to be backed-up. Once a name is selected, click **Backup** to create the backup file. The backed-up files are automatically placed in the following directory: EMS Program Files\User Data\\**Name of Current Open Database*\ PI-Backup Data\. Since the backup files are put in these locations it is important to be in the correct database when backing-up files and importing files from the handheld device.

List of previously backed up databases

Enter desired name for the backup file



## Import Backup Data into PAVER

After backup files have been created, the user may then **Import Backup Data into PAVER** by using the third tab on the Handheld Inspector menu. First select the backup file to import by hitting the **Select** button and choosing from the list.

### Hint

When downloading and importing data, make sure the correct PAVER database is online.

Note: PAVER automatically places and selects files from a default location: EMS Program Files\User Data\\*Name of Database\*\PI-Backup Data\.

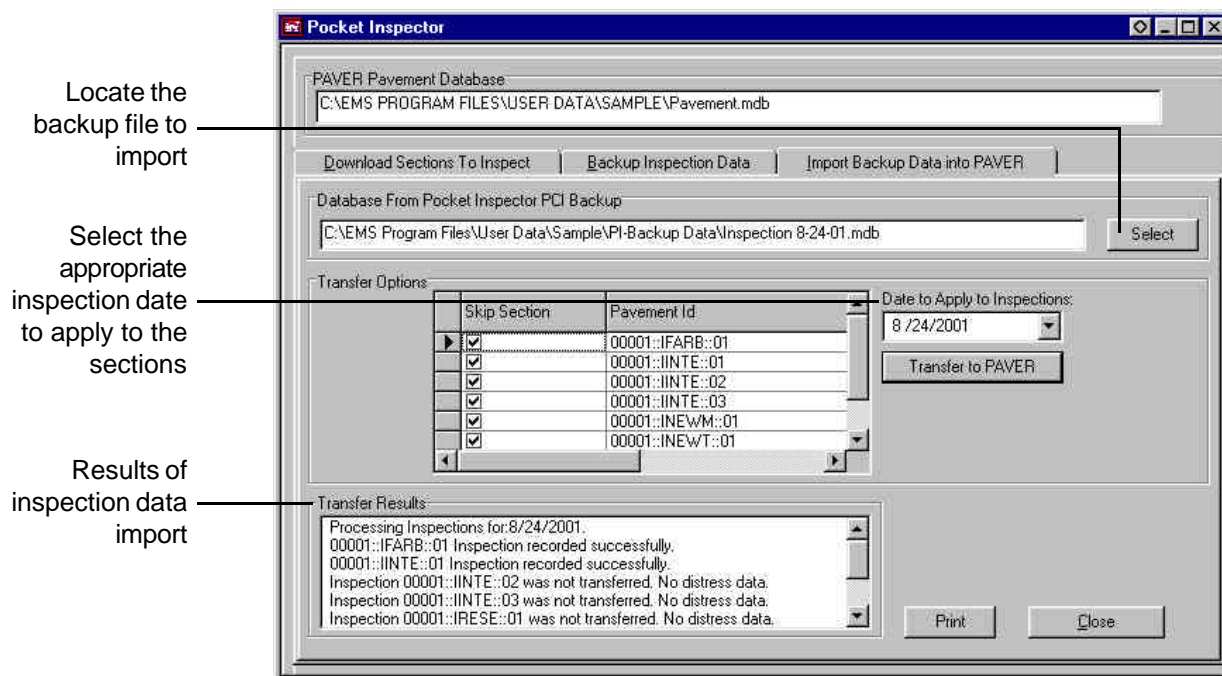
After selecting the backup file, select the inspection date to apply to the data.

Note: If some sections were not inspected or a different inspection date is required for some sections, check the box next to the sections that should be skipped.

Finally, click **Transfer to PAVER** to transfer the files into PAVER. The transfer results indicate what sections were successfully imported and which ones were not.

Note: if a section has no inspection information, the information is not imported into PAVER for that inspection date.

If desired, the transfer results may be printed by clicking the **Print** button at the bottom of the tab.



# Appendix A

## Inspection Information File Format (*Standard and Extended Formats*)

The following description is based on a “Card” model, where the “Cards” are now represented by lines in a text file. Files are in ASCII text, fixed width format. *Note: Micro PAVER 4.1 and later support the extended branch and section number fields.*

### 07 (AC or GR) and 10 (PCC) Card Format

These cards contain section header information and supplemental inspection. One card required per section inspected.

<u>Field Name</u>	<u>Format</u>	<u>Columns - Standard</u>	<u>Columns - Extended</u>
Form ID	Numeric	1-2	1-2
Inspection Date	MMDDYY	3-8	3-8
Branch Number	Alpha-Numeric	9-13	9-18
Section Number	Alpha-Numeric	14-16	19-28
Add/Change/Delete	Alpha-Numeric	17	29
Riding	Alpha-Numeric	18-20	30-32
Safety	Alpha-Numeric	21-23	33-35
Drainage	Alpha-Numeric	24-26	36-38
Shoulder	Alpha-Numeric	27-29	39-41
Overall	Alpha-Numeric	30-32	42-44
FOD	Alpha-Numeric	33-35	45-47
Total No. of Samples in Section	Numeric	36-38	48-50

Select \* from [Plan Parameters]

### 08 (AC or GR) and 11 (PCC) Card Format

These cards contain sample unit and distress information. One or more cards are required per sample unit inspected and can contain up to four distresses per card. (I.E. A separate card may be used for each distress.) *nnnnn.nn is a decimal number*

<u>Field Name</u>	<u>Format</u>	<u>Columns - Standard</u>	<u>Columns - Extended</u>
Form ID	Numeric	1-2	1-2
Inspection Date	MMDDYY	3-8	3-8
Branch Number	Alpha-Numeric	9-13	9-18
Section Number	Alpha-Numeric	14-16	19-28
Add/Change/Delete	Alpha-Numeric	17	29
Sample Unit ID	Alpha-Numeric	18-20	30-32
Sample Type	Alpha-Numeric	21	33
Area/ No. of Slabs in Sample	nnnnn.nn	22-29	34-41
Distress Code	Numeric	30-31	42-43
Severity	Alpha-Numeric	32	44
Quantity	nnnnn.nn	33-40	45-52
Distress Code	Numeric	41-42	53-54
Severity	Alpha-Numeric	43	55
Quantity	nnnnn.nn	44-51	56-63
Distress Code	Numeric	52-53	64-65
Severity	Alpha-Numeric	54	66
Quantity	nnnnn.nn	55-62	67-74
Distress Code	Numeric	63-64	75-76
Severity	Alpha-Numeric	65	77
Quantity	nnnnn.nn	66-73	78-85

# Appendix B-1

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## Video Inspection Import Data Format (ASCII Text)

### File Specifications for PCIVideo Interface to PAVER

#### Example User Interfaces

##### **PCIVasc2PVR.exe**

User interface for the use of Distress Data collected into ASCII files. It is recommended that the complete parameter string be enclosed in quotes (“”).

##### Command Line Parameters:

PVR=C:\EMS Program Files\	Directory containing the PAVER PAVEMENT.MDB
PDIR=C:\EMS Program Files\User Data\Sample\	Directory containing the ASCII text files
IDIR=C:\EMS Program Files\PCIVideo	Directory containing the ASCII text files
INSP=PCIVInspection.txt	File containing Inspection information
SAMP=PCIVSample.txt	File containing Sample information
FRAM=PCIVFrame.txt	File containing Frame information
DIST=PCIVDistress.txt	File containing Distress information
COND=PCIVCondition.txt	File containing Condition information
OPTN=PCIVOptions.txt	File containing PCIVideo options
INTERACTIVE	If present, force display of UI

##### **PCIVdb2PVR.exe**

User interface for the use of Distress Data collected into an pre-configured Access database. It is recommended that the complete parameter string be enclosed in quotes (“”).

##### Command Line Parameters:

PVR=C:\EMS Program Files\	Directory containing the PAVER PAVEMENT.MDB
PDIR=C:\EMS Program Files\User Data\Sample\	Directory containing the PAVER PAVEMENT.MDB
IDIR=C:\EMS Program Files\PCIVideo	Directory containing PCIVIntermediateFile.mdb
INTERACTIVE	If present, force display of UI

Six text files are needed to perform an import of video inspection data.  
The following file formats support the import of collected frame distress data.

- Fields are separated by commas
- Strings are enclosed by quotes
- Dates are enclosed by pound signs
- Network, Branch, and Section are separated by 2 colons
- Optional fields may be blank but present

## **PCIVideoOptions.txt**

Line 1:  
FieldA,FieldB,FieldC  
"Metric","Data collected in contract #xxx","PID"  
  
Line 2..n: (Optional)  
FieldA  
Spacer:00000  
DEFAULTFRAME SIZE:260  
DEFAULTFRAMEUNITS:SQF

### **Where:**

#### **Line 1:**

FieldA      Data values were collected in "English" or "Metric"  
FieldB      Comment to associate with the execution of this process.  
FieldC      Method of data association (Uniqueld / PID / SID)

## **PCIVideoInspection.txt**

FieldA,FieldB,FieldC,FieldD,FieldE  
"RSPARK::IFARB:01",#6/5/2000#,"optional",4,"optional"

### **Where:**

FieldA      The identifier of the section which "owns" this inspection  
             NETWORKID::BRANCHID::SECTIONID  
             SPACER  
FieldB      Identifies the date common to all data from this inspection (multi-day inspections just pick  
             a day)  
FieldC      Usually some observations resulting from inspection.  
FieldD      How many samples in the inspection.  
FieldE      Indicates the origin of the inspection data

## **PCIVideoSample.txt**

FieldA,FieldB,FieldC,FieldD,FieldE,FieldF,FieldG  
"RSPARK::IFARB:01",#6/5/2000#,"1SMP2","R",52.95,"SqM","Sample Comment"

### **Where:**

FieldA      The identifier of the section which "owns" this inspection  
             NETWORKID::BRANCHID::SECTIONID  
             SPACER  
FieldB      Identifies the date common to all data from this inspection (multi-day inspections just pick  
             a day)  
FieldC      Assigned by video vendor for this video sample (must be unique within section and inspec-  
             tion date)  
FieldD      Size of Sample

FieldE	Unit of measure (as defined in PAVER) for the Sample Size
FieldF	Survey or Detail Comment regarding Sample

### **PCIVideoFrame.txt**

FieldA,FieldB,FieldC,FieldD,FieldE,FieldF,FieldG,FieldH,FieldI,FieldJ  
 "RSPARK::IFARB:01",#6/5/2000#,"1FRM2","",52.95,"SqM","START","END","LATITUDE","LONGITUDE"

Where:

FieldA	The identifier of the section which "owns" this inspection NETWORKID::BRANCHID::SECTIONID SPACER
FieldB	Identifies the date common to all data from this inspection (multi-day inspections just pick a day)
FieldC	Assigned by video vendor Identifier for this video frame (must be unique within section and inspection date)
FieldD	Identifies this sample (optional)
FieldE	Size of Frame
FieldF	Unit of measure (as defined in PAVER) for the Frame Size
FieldG	Distance from start of film to begin of inspection frame (optional)
FieldH	Distance from start of film to end of inspection frame (optional)
FieldI	LATITUDE-GPS String of Degree, Minutes, Seconds (optional)
FieldJ	LONGITUDE -GPS String of Degree, Minutes, Seconds (optional)

### **PCIVideoDistress.txt**

FieldA,FieldB,FieldC,FieldD,FieldE,FieldF,FieldG,FieldH,FieldI,FieldJ  
 "RSPARK::IFARB:01",#6/5/2000#,"","1FRM2", 7 ,"H", 1.46304001808166 ,"M","EDGE CRACKING"

Where:

FieldA	The identifier of the section which "owns" this inspection NETWORKID::BRANCHID::SECTIONID SPACER
FieldB	Identifies the date common to all data from this inspection (multi-day inspections just pick a day)
FieldC	Sample number which owns this distress (if any)
FieldD	Assigned by video vendor Identifier for this video frame (must be unique within section and inspection date)
FieldE	The distress code as used in PAVER (integer)

FieldF  
H, M, L (if severity is used for the given distress code)

FieldG  
The quantity of the distress (for Distress numbers with quantity defined)

FieldH  
Unit of measure (as defined in PAVER) for the quantity

FieldI  
Available for any comment/observation by the data collector (optional)

### **PCIVideoCondition.txt**

```
FieldA,FieldB,FieldC,FieldD,FieldE,FieldF,FieldG,FieldH
"RSPARK::IFARB:01",#6/5/2000#,""," ", 21 ,"" ,"IRI","Automated data collection"
```

Where:

FieldA  
The identifier of the section which "owns" this inspection  
NETWORKID::BRANCHID::SECTIONID  
SPACER

FieldB  
Identifies the date common to all data from this inspection (multi-day inspections just pick a day)

FieldC  
Sample number which owns this distress (if any)

FieldD  
Assigned by video vendorIdentifier for this video frame (must be unique within section and inspection date)

FieldE  
The Numeric Condition value to be recorded.  
Only populate FieldE or FieldF as determined by the data type for the Condition Method.

FieldF  
The Textural Condition value to be recorded.

FieldG  
The Condition Method (IRI / PCI / PCIV / etc.)

FieldH  
Source of the Condition value. (optional)

### **Units of Measure valid for PCIVideo**

<b><u>UNIT</u></b>	<b><u>System</u></b>
F	English
FT	English
LF	English
SF	English
SQF	English
SQFT	English
M	Metric
SM	Metric
SQM	Metric
COUNT	Metric or English
SLAB	Metric or English
SLABS	Metric or English



# Appendix B-2

## Video Inspection Import Data Format (Access Database)

There are five data tables that can be created in Microsoft Access to input data. They include the following:

- **PCIVideoDistress**
- **PCIVideoCondition**
- **PCIVideoInspection**
- **PCIVideoSample**
- **PCIVideoFrame**

At least one of the two tables in bold type are required. Optional tables can be used to record additional descriptive data if available. In general, data values that have been filled in are required and those listed as optional can be omitted.

The screenshot displays the Microsoft Access interface with five data tables open. Each table is shown in a separate window with its own title bar and menu bar.

**PCIVideoInspection : Table**

SUniqueID	Date	Comment
SID	1/1/99	optional

Record: 2 of 2

**PCIVideoSample : Table**

SUniqueID	Date	SAMPLENR	SAMPLETYPE	Size	Units	Comments
SID 001	1/1/99	Reqd	optional	500	????	optional

Record: 1 of 1

**PCIVideoFrame : Table**

FrameID	SUniqueID	Date	SAMPLENR	XXXX
FR 001	SID 001	1/1/99	optnl	????

Record: 1 of 1

**PCIVideoDistress : Table**

SUniqueID	Date	SampleNR	FrameID	Distress	Description	SEVERITY	Units	Comments	QUANTITY	Quar
SID 001	1/1/99	optnl	(optional)	1	(optional)	H	optional	optional	23	option

Record: 1 of 1

**PCIVideoCondition : Table**

SUniqueID	Date	SampleNR	FrameID	Condition	TextValue	Method
SID 001	1/1/99	optnl	(optional)	55	55	PCIV
SID 001	1/1/99	optnl	(optional)	25	(optional)	IRI

Record: 2 of 2

Identifies the date common to all data from this inspection (multi-day inspections just pick a day)

# Appendix C

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## Abbreviations of Surface Types

<u>Abbreviation</u>	<u>Complete Name</u>	<u>Distress Manual Reference</u>
AAC	Asphalt overlay over asphalt concrete	Asphalt
ABR	Asphalt over brick	Asphalt
AC	Asphalt concrete	Asphalt
ACT	Asphalt over cement treated base	Asphalt
APC	Asphalt overlay over Portland cement concrete	Asphalt
APZ	Asphalt over pozzolanic base	Asphalt
BR	Brick	Asphalt
COB	Cobblestone	Asphalt
GR	Gravel	Unsurfaced
PCC	Portland cement concrete	Concrete
PVB	Paving blocks	Asphalt
ST	Surface treatment	Asphalt
X	Other	Unsurfaced

# Appendix D

## Pavement Data Exchange (PDE) Format

OBJECT NAME	DATA TYPE	DATA SIZE	USAGE
Table	SITE		SITE.DBF (PAVER Database and Contact Information)
Field	AGENCY	Text	61 PAVER Agency responsible for data maintenance
Field	SECUR	Text	25 *INTERNAL USE* *VALUE NOT REQUIRED*
Field	UNIT	Text	7 Data units in "ENGLISH" or "METRIC"
Field	NAME	Text	25 PAVER Data Coordinator Name
Field	ADDR	Text	52 PAVER Data Coordinator Address
Field	CTYSTA	Text	30 PAVER Data Coordinator City and State
Field	ZIPCODE	Text	10 PAVER Data Coordinator Zip Code
Field	PHONE	Text	21 PAVER Data Coordinator Phone Number
Field	PASSWRD	Text	8 *INTERNAL USE* *VALUE NOT REQUIRED*
Field	AGENCYID	Text	5 PAVER Agency Id
Table	FAMILY		FAMILY.DBF (Family Models)
Field	FAMILY	Text	20 Model name.
Field	MAXAGE	Number (Double)	8 Max age to be used for model.
Field	COEFF1	Number (Double)	8 Model 1st coefficient.
Field	COEFF2	Number (Double)	8 Model 2nd coefficient.
Field	COEFF3	Number (Double)	8 Model 3rd coefficient.
Field	COEFF4	Number (Double)	8 Model 4th coefficient.
Table	POLICY1		POLICY1.DBF (Maintenance Policy Names)
Field	POLICY	Number (Double)	8 Maintenance policy Id
Field	DESCRIPT	Text	30 Description of maintenance policy
Table	POLICY2		POLICY2.DBF (Maintenance Policy Details)
Field	POLICY	Number (Double)	8 Maintenance policy Id
Field	DISTRESS	Number (Double)	8 Distress for policy consideration
Field	SEVERITY	Text	1 Distress severity for policy consideration
Field	WORKTYPE	Text	5 Work type considered for distress and severity
Field	MATERIAL	Number (Double)	8 Material type considered for distress and severity
Field	EXTRA1	Number (Double)	8 *INTERNAL USE* *VALUE NOT REQUIRED*
Field	EXTRA2	Number (Double)	8 *INTERNAL USE* *VALUE NOT REQUIRED*
Field	UNITCOST	Number (Double)	8 Cost per work type unit
Table	NETWORK		NETWORK.DBF (Pavement Network Inventory)
Field	NETWORK	Text	10 Large group of pavements. Usually Airport, City, Sub-Division Identifier
Field	NAME	Text	61 Description of pavement network.
Field	NSORT1	Text	10 Supplemental value for selecting networks
Field	NSORT2	Text	10 Supplemental value for selecting networks
Field	NSORT3	Text	10 Supplemental value for selecting networks

OBJECT NAME	DATA TYPE	DATA SIZE	USAGE
Table	BRANCH		BRANCH.DBF (Pavement Branch Inventory)
Field	NETWORK	Text	10 Large group of pavements. Usually Airport, City, Sub-Division Identifier
Field	BRANCH	Text	10 Medium grouping of pavements. Usually runway, taxiway, apron, street name.
Field	NAME	Text	25 Description of pavement branch.
Field	USE	Text	10 Branch use. ROADWAY, APRON, RUNWAY, TAXI WAY, Etc.
Field	SECTIONS	Number (Double)	8 Number of pavement sections in the branch.
Field	AREA	Number (Double)	8 Total area of all sections in the branch.
Field	COMMENTS	Text	70 Any additional comments about the branch.
Field	BSORT1	Text	10 Supplemental value for selecting branches
Field	BSORT2	Text	10 Supplemental value for selecting branches
Field	BSORT3	Text	10 Supplemental value for selecting branches
Table	SECTION		SECTION.DBF (Pavement Section Inventory)
Field	NETWORK	Text	10 Large group of pavements. Usually Airport, City, Sub-Division Identifier
Field	BRANCH	Text	10 Medium grouping of pavements. Usually runway, taxiway, apron, street name.
Field	SECTION	Text	10 Area of same pavement type. This is the unit of pavement used for inspection rating methods.
Field	FROM	Text	25 Starting location of pavement section
Field	TOO	Text	25 Ending location of pavement section
Field	ZONE	Text	4 User specified indicator for funding sources, maintenance areas, etc.
Field	CATEGORY	Text	1 Section category (A-Z, 0-9)
Field	RANK	Text	1 Pavement rank (A=Principal, B=Arterial, C=Collector, D=Industrial, E=Residential, N=Not Applicable, P=Primary, S=Secondary, T=Tertiary, X=Other)
Field	SURFACE	Text	10 Surface type (AAC, ABR, AC, ACT, APC, APZ, BR, COB, GR, PCC, PVB, ST, X)
Field	SECLN	Number (Double)	8 Section Length
Field	SECWID	Number (Double)	8 Section Width
Field	SECAREA	Number (Double)	8 Section Area
Field	SLABLEN	Number (Double)	8 Slab length
Field	SLABWID	Number (Double)	8 Slab width
Field	NUMSLAB	Number (Double)	8 Number of slabs
Field	JOINTLEN	Number (Double)	8 Slab joint length
Field	LCD	Date/Time	8 Last construction date
Field	LID	Date/Time	8 Last inspection date
Field	LPCI	Number (Double)	8 Last inspection PCI condition
Field	FAMILY	Text	8 Family model assigned to section
Field	SHOULDER	Text	3 Shoulder type
Field	STRTYPE	Text	3 Street type
Field	GRADE	Number (Double)	8 Pavement grade in degrees
Field	LANES	Number (Double)	8 Number of lanes in section
Field	SSORT1	Text	10 Supplemental value for selecting sections
Field	SSORT2	Text	10 Supplemental value for selecting sections
Field	SSORT3	Text	10 Supplemental value for selecting sections

OBJECT NAME	DATA TYPE	DATA SIZE	USAGE
Table	SAMPLE		SAMPLE.DBF (Inspection Sample Details)
Field	NETWORK	Text	10 Large group of pavements. Usually Airport, City, Sub-Division Identifier
Field	BRANCH	Text	10 Medium grouping of pavements. Usually runway, taxiway, apron, street name.
Field	SECTION	Text	10 Area of same pavement type. This is the unit of pavement used for inspection rating methods.
Field	INSDAT	Date/Time	8 Date of inspection.
Field	SAMPLE	Text	10 Sample Id
Field	TYPE	Text	1 Sample type R=Random A=Additional
Field	SIZE	Number (Double)	8 Sample size, area or slabs
Field	PCI	Number (Double)	8 Sample PCI Condition
Field	DISTRESS	Number (Double)	8 Distress code
Field	SEVERITY	Text	1 Distress severity
Field	QTY	Number (Double)	8 Quantity of distress
Table	XDIST		XDIST.DBF (Inspection Extrapolated Distress Information)
Field	NETWORK	Text	10 Large group of pavements. Usually Airport, City, Sub-Division Identifier
Field	BRANCH	Text	10 Medium grouping of pavements. Usually runway, taxiway, apron, street name.
Field	SECTION	Text	10 Area of same pavement type. This is the unit of pavement used for inspection rating methods.
Field	INSDAT	Date/Time	8 Date of inspection.
Field	DISTRESS	Number (Double)	8 Distress code
Field	SEVERITY	Text	1 Distress severity
Field	QTY	Number (Double)	8 Quantity of distress
Field	DENSITY	Number (Double)	8 Density of distress for severity
Field	DEDUCT	Number (Double)	8 PCI points to deduct for this distress for severity
Table	CONDHIST		CONDHIST.DBF (Inspection Summary Results)
Field	NETWORK	Text	10 Large group of pavements. Usually Airport, City, Sub-Division Identifier
Field	BRANCH	Text	10 Medium grouping of pavements. Usually runway, taxiway, apron, street name.
Field	SECTION	Text	10 Area of same pavement type. This is the unit of pavement used for inspection rating methods.
Field	INSDAT	Date/Time	8 Date of inspection.
Field	RIDE	Text	3 Condition rating: Ride Quality
Field	SAFETY	Text	3 Condition rating: Safety
Field	DRAIN	Text	3 Condition rating: Drainage Condition
Field	SHOULDER	Text	3 Condition rating: Shoulder Quality
Field	OVERALL	Text	3 Condition rating: Overall Condition
Field	FOD	Text	3 Condition rating: Foreign Object Damage
Field	SAMPLES	Number (Double)	8 Samples in section
Field	SAMPLE	Number (Double)	8 Samples in section
Field	PCI	Number (Double)	8 Condition rating: PCI
Field	RANDOM	Number (Double)	8 Random samples in section
Field	ADDITION	Number (Double)	8 Additional samples in section
Field	MINSAM	Number (Double)	8 Minimum number of samples recommended for section
Field	PCISTA	Number (Double)	8 *INTERNAL USE* *VALUE NOT REQUIRED*
Field	LOAD	Number (Double)	8 Percent of distress due to: LOAD
Field	CLIMATE	Number (Double)	8 Percent of distress due to: CLIMATE
Field	OTHER	Number (Double)	8 Percent of distress due to: OTHER

OBJECT NAME	DATA TYPE	DATA SIZE	USAGE
Table	TRAFFIC		TRAFFIC.DBF (Traffic survey Details)
Field	NETWORK	Text	10 Large group of pavements. Usually Airport, City, Sub-Division Identifier
Field	BRANCH	Text	10 Medium grouping of pavements. Usually runway, taxiway, apron, street name.
Field	SECTION	Text	10 Area of same pavement type. This is the unit of pavement used for inspection rating methods.
Field	SURVEY	Date/Time	8 Starting date of traffic survey
Field	AIRTYPE	Text	15 (Airfields) Aircraft model
Field	ANNDEP	Number (Double)	8 (Airfields) Annual number of departures
Field	AVDAILY	Number (Double)	8 (Airfields) Average number of daily departures
Field	PERDESGN	Number (Double)	8 (Roadways) Percent of traffic in design lane
Field	PER2AT	Number (Double)	8 (Roadways) Percent of twin axle trucks in design lane
Field	PER3AT	Number (Double)	8 (Roadways) Percent of trucks with 3 or more axles in design lane
Field	ESAL	Number (Double)	8 (Roadways) Annual ESAL in design lane
Field	COMMENT	Text	70 Comments related to traffic survey
Field	ENDDATE	Date/Time	8 Ending date of traffic survey
Table	MATPRO		MATPRO.DBF (Layer and Materials Testing Details)
Field	NETWORK	Text	10 Large group of pavements. Usually Airport, City, Sub-Division Identifier
Field	BRANCH	Text	10 Medium grouping of pavements. Usually runway, taxiway, apron, street name.
Field	SECTION	Text	10 Area of same pavement type. This is the unit of pavement used for inspection rating methods.
Field	LAYER	Text	10 Layer type: OVERLAY, SURFACE, BASE, SUBBASE, SUBGRADE
Field	TESTTYPE	Text	50 Test type
Field	TESTDATE	Date/Time	8 Date of test
Field	TESTLOC	Text	10 Location of test
Field	TESTVAL	Text	10 Result value of test
Field	DEPTH	Number (Double)	8 Depth from layer surface
Field	COMMENT	Text	70 Comments related to Material Test
Table	WORREQ		WORKREQ.DBF (Pavement Work Required Details)
Field	NETWORK	Text	10 Large group of pavements. Usually Airport, City, Sub-Division Identifier
Field	BRANCH	Text	10 Medium grouping of pavements. Usually runway, taxiway, apron, street name.
Field	SECTION	Text	10 Area of same pavement type. This is the unit of pavement used for inspection rating methods.
Field	WORKTYPE	Text	5 Work type code
Field	STADATE	Date/Time	8 Date to start project
Field	IDDATE	Date/Time	8 Proposed date to start project
Field	PROPOSAL	Text	12 Proposal Id
Field	PHASE	Text	2 Project phase
Field	ACCOMP	Text	1 Manner Accomplished I=Inhouse C=Contractor
Field	QTY	Number (Double)	8 Quantity of work type to be performed
Field	COST	Number (Double)	8 Cost based on work type and quantity
Field	MATERIAL	Number (Double)	8 Material type used for work type
Field	THICK	Number (Double)	8 Thickness of material
Field	COMMENT	Text	70 Comments related to project

OBJECT NAME	DATA TYPE	DATA SIZE	USAGE
Table	WORKHIST		WORKHIST.DBF (Pavement Work History Details)
Field	NETWORK	Text	10 Large group of pavements. Usually Airport, City, Sub-Division Identifier
Field	BRANCH	Text	10 Medium grouping of pavements. Usually runway, taxiway, apron, street name.
Field	SECTION	Text	10 Area of same pavement type. This is the unit of pavement used for inspection rating methods.
Field	WORKTYPE	Text	5 Work type code
Field	COMPLETE	Date/Time	8 Date work completed
Field	MATERIAL	Number (Double)	8 Material type used for work type
Field	THICK	Number (Double)	8 Thickness of material
Field	ACCOMP	Text	1 Manner Accomplished I=Inhouse C=Contractor
Field	QTY	Number (Double)	8 Quantity of work type to be performed
Field	COST	Number (Double)	8 Cost based on work type and quantity
Field	COMMENT	Text	70 Comments related to project
Field	STADATE	Date/Time	8 Date project started
Field	IDDATE	Date/Time	8 Proposed date to start project
Field	PROPOSAL	Text	12 Proposal Id
Field	PHASE	Text	2 Project phase
Table	NDT1		NDT1.DBF (FWD Testing Summary)(Not imported into PAVER 4.0)
Field	NETWORK	Text	10 Large group of pavements. Usually Airport, City, Sub-Division Identifier
Field	BRANCH	Text	10 Medium grouping of pavements. Usually runway, taxiway, apron, street name.
Field	SECTION	Text	10 Area of same pavement type. This is the unit of pavement used for inspection rating methods.
Field	LOCATION	Number (Double)	8 Area tested. (Center, Wheel Path, Edge Loading, Corner, Etc.)
Field	STATION	Number (Double)	8 Station number tested
Field	TESTDATE	Date/Time	8 Date of testing
Field	TEMP	Number (Double)	8 Air temperature
Field	LOAD	Number (Double)	8 Test load in kilograms
Field	MAXDEF	Number (Double)	8 Maximum deflection in mils
Field	TRANSFER	Number (Double)	8 Load transfer in percent
Field	TESTTYPE	Text	1 NDT type: D=Design, A=Average
Table	NDT2		NDT2.DBF (FWD Testing Detail)(Not imported into PAVER 4.0)
Field	NETWORK	Text	10 Large group of pavements. Usually Airport, City, Sub-Division Identifier
Field	BRANCH	Text	10 Medium grouping of pavements. Usually runway, taxiway, apron, street name.
Field	SECTION	Text	10 Area of same pavement type. This is the unit of pavement used for inspection rating methods.
Field	LOCATION	Number (Double)	8 Area tested. (Center, Wheel Path, Edge Loading, Corner, Etc.)
Field	STATION	Number (Double)	8 Station number tested
Field	TESTDATE	Date/Time	8 Date of testing
Field	TEMP	Number (Double)	8 Air temperature
Field	LOAD	Number (Double)	8 Test load in kilograms
Field	SENSOR	Number (Double)	8 Sensor measured
Field	DISTANCE	Number (Double)	8 Sensor distance from load
Field	DEFLECT	Number (Double)	8 Sensor deflection in mils

# Appendix E

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## Example Pavement Survey Forms

Included on the following pages are some example forms for surveying asphalt and concrete pavements. The six example forms are:

- Concrete Surfaced Roads and Parking Lots
- Asphalt Surfaced Roads and Parking Lots
- Airfield Concrete Pavement
- Airfield Asphalt Pavement
- Unsurfaced Roads
- Deduct Values



<b>CONCRETE SURFACED ROADS AND PARKING LOTS CONDITION SURVEY DATA SHEET FOR SAMPLE UNIT</b>
---

BRANCH				SECTION		SAMPLE UNIT									
SURVEYED BY				DATE		SAMPLE AREA									
<div style="text-align: center;"> <u><b>DISTRESS TYPES</b></u>   <b>31. Polished Aggregate</b>  <b>32. Poouts</b>  <b>33.Pumping</b>  <b>34. Punchout</b>  <b>35. Railroad Crossing</b>  <b>36. Scaling</b>  <b>37. Shrinkage</b>  <b>38. Spalling Corner</b>  <b>39. Spalling Joint</b> </div>				<div style="text-align: center;"> <b>SKETCH:</b>   <div style="display: flex; justify-content: space-around; align-items: center;"> <span>?</span><span>?</span><span>?</span><span>?</span><span>?</span> </div> </div>											
								<div style="text-align: right; font-weight: bold;">10</div>							
												<div style="text-align: right; font-weight: bold;">9</div>			
<div style="text-align: right; font-weight: bold;">7</div>															
				<div style="text-align: right; font-weight: bold;">6</div>											
<div style="text-align: right; font-weight: bold;">5</div>															
				<div style="text-align: right; font-weight: bold;">4</div>											
<div style="text-align: right; font-weight: bold;">3</div>															
				<div style="text-align: right; font-weight: bold;">2</div>											
<div style="text-align: right; font-weight: bold;">1</div>															
				<div style="display: flex; justify-content: space-around;"> <span>1</span><span>2</span><span>3</span><span>4</span> </div>											

<b>ASPHALT SURFACED ROADS AND PARKING LOTS</b> <b>CONDITION SURVEY DATA SHEET</b> <b>FOR SAMPLE UNIT</b>	
<b>BRANCH</b>	<b>DATE</b>
<b>SURVEYED BY</b>	<b>SAMPLE UNIT</b>
<b>SECTION</b>	<b>SAMPLE AREA</b>

**SKETCH:**

- |                             |                               |  |                                |
|-----------------------------|-------------------------------|--|--------------------------------|
| 1. Alligator Cracking Sq Ft | 6. Depression Sq Ft           | 11. Patching & Util Cut Patching Sq Ft | 16. Shoving Sq Ft              |
| 2. Bleeding Sq Ft           | 7. Edge Cracking Ft           | 12. Polished Aggregate Sq Ft           | 17. Slippage Cracking Sq Ft    |
| 3. Block Cracking Sq Ft     | 8. Jt. Reflection Cracking Ft | 13. Potholes Count                     | 18. Swell Sq Ft                |
| 4. Bumps and Sags Ft        | 9. Lane/Shoulder Drop Off Ft  | 14. Railroad Crossing Sq Ft            | 19. Weathering/Ravelling Sq Ft |
|                             |                               | 15. Rutting Sq Ft                      |                                |

[illegible]

## AIRFIELD CONCRETE PAVEMENTS CONDITION SURVEY DATA SHEET FOR SAMPLE UNIT

BRANCH				SECTION		SAMPLE UNIT	
SURVEYED BY				DATE		SAMPLE AREA	
<p align="center"><b><u>DISTRESS TYPES</u></b></p> <p>69. Pumping</p> <p>70. Scaling/Map Crack/ Crazing</p> <p>71. Settlement/Fault</p> <p>72. Shattered Slab</p> <p>73. Shrinkage Crack</p> <p>74. Spalling-Joints</p> <p>75. Spalling-Corner</p>				<p><b>SKETCH:</b></p>			
				<p align="center">?      ?      ?      ?      ?</p>			
				<p align="right"><b>10</b></p>			
				<p align="center">?      ?      ?      ?      ?</p>			
				<p align="right"><b>9</b></p>			
				<p align="center">?      ?      ?      ?      ?</p>			
DIST TYPE	NO. SLABS	DENSITY %	DEDUCT VALUE	<p align="right"><b>8</b></p>			
				<p align="center">?      ?      ?      ?      ?</p>			
				<p align="right"><b>7</b></p>			
				<p align="center">?      ?      ?      ?      ?</p>			
				<p align="right"><b>6</b></p>			
				<p align="center">?      ?      ?      ?      ?</p>			
				<p align="right"><b>5</b></p>			
				<p align="center">?      ?      ?      ?      ?</p>			
				<p align="right"><b>4</b></p>			
				<p align="center">?      ?      ?      ?      ?</p>			
				<p align="right"><b>3</b></p>			
				<p align="center">?      ?      ?      ?      ?</p>			
				<p align="right"><b>2</b></p>			
				<p align="center">?      ?      ?      ?      ?</p>			
				<p align="right"><b>1</b></p>			
				<p align="center">?      ?      ?      ?      ?</p>			
				<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>

<div style="text-align: center;"> <b>AIRFIELD ASPHALT PAVEMENT CONDITION SURVEY DATA SHEET FOR SAMPLE UNIT</b> </div>	
<b>BRANCH</b>	<b>DATE</b>
<b>SURVEYED BY</b>	<b>SAMPLE UNIT</b>
<b>SECTION</b>	<b>SAMPLE AREA</b>

41. Alligator Cracking Sq Ft	45. Depression Sq Ft	49. Oil Spillage Sq Ft	53. Rutting Sq Ft
42. Bleeding Sq Ft	46. Jet Blast Sq Ft	50. Patching Sq Ft	54. Shoving from PCC Sq Ft
43. Block Cracking Sq Ft	47. Jt. Reflection (PCC) Ft	51. Polished Aggregate Sq Ft	55. Slippage Cracking Sq Ft
44. Corrugation Sq Ft	48. Long. & Trans. Cracking Ft	52. Raveling/Weathering Sq Ft	56. Swell Sq Ft

[illegible]

<b>UNSURFACED ROADS</b> <b>CONDITION SURVEY DATA SHEET</b> <b>FOR SAMPLE UNIT</b>	
<b>BRANCH</b>	<b>DATE</b>
<b>SURVEYED BY</b>	<b>SAMPLE UNIT</b>
<b>SECTION</b>	<b>SAMPLE AREA</b>

**SKETCH:**

<p>1. <b>Improper Cross Section</b> Linear Ft</p> <p>2. <b>Inadequate Roadside Drainage</b> Sq Ft</p> <p>3. <b>Corrugations</b> Sq Ft</p> <p>5. <b>Dust</b></p>	<p>13. <b>Potholes</b> Count</p> <p>12. <b>Ruts</b> Sq Ft</p> <p>12. <b>Loose Aggregate</b> Linear Ft</p>
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[illegible]

[illegible]

# Appendix F

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## Load & Climate Distresses

### Asphalt Surfaced Roads and Parking Lots

#### Pavement Distress

1. Alligator Cracking
2. Bleeding
3. Block Cracking
4. Bumps & Sags
5. Corrugation
6. Depression
7. Edge Cracking
8. Joint Reflection Cracking
9. Lane/Shoulder Drop Off
10. Longitudinal/Transverse Cracking
11. Patch/Utility Cut
12. Polished Aggregate
13. Pothole
14. Railroad Crossing
15. Rutting
16. Shoving
17. Slippage Cracking
18. Swell
19. Weathering/Raveling

#### Distress Type

- Load
- Other
- Climate/Durability
- Other
- Other
- Other
- Load
- Climate/Durability
- Other
- Climate/Durability
- Other
- Other
- Load
- Other
- Load
- Other
- Other
- Other
- Climate/Durability

### Concrete Surfaced Roads and Parking Lots

#### Pavement Distress

21. Blow Up
22. Corner Break
23. Divided Slab
24. Durability Cracking

#### Distress Type

- Climate/Durability
- Load
- Load
- Climate/Durability

25. Faulting	Other
26. Joint Seal Damage	Climate/Durability
27. Lane/Shoulder Drop Off	Other
28. Linear Cracking	Load
29. Large Patch/Utility Cut	Other
30. Small Patch	Other
31. Polished Aggregate	Other
32. Popouts	Other
33. Pumping	Other
34. Punchout	Load
35. Railroad Crossing	Other
36. Scaling/Crazing	Other
37. Shrinkage Cracking	Climate/Durability
38. Corner Spalling	Climate/Durability
39. Joint Spalling	Climate/Durability

## **Asphalt Surfaced Airfields**

### **Pavement Distress**

41. Alligator Cracking	Load
42. Bleeding	Other
43. Block Cracking	Climate/Durability
44. Corrugation	Other
45. Depression	Other
46. Jet Blast	Other
47. Joint Reflection Cracking	Climate/Durability
48. Longitudinal/Transverse Cracking	Climate/Durability
49. Oil Spillage	Other
50. Patching	Climate/Durability
51. Polished Aggregate	Other
52. Weathering/Raveling	Climate/Durability
53. Rutting	Load
54. Shoving	Other
55. Slippage Cracking	Other
56. Swell	Other

### **Distress Type**



## Concrete Surfaced Airfields

### Pavement Distress

61. Blow Up
62. Corner Break
63. Linear Cracking
64. Durability Cracking
65. Joint Seal Damage
66. Small Patch
67. Large Patch/Utility Cut
68. Popouts
69. Pumping
70. Scaling/Crazing
71. Faulting
72. Shattered Slab
73. Shrinkage Cracking
74. Joint Spalling
75. Corner Spalling

### Distress Type

- Climate/Durability
- Load
- Load
- Climate/Durability
- Climate/Durability
- Other
- Other
- Other
- Other
- Other
- Other
- Load
- Other
- Other
- Other

## Unsurfaced Roads

### Pavement Distress

81. Improper Cross Section
82. Inadequate Roadside Drainage
83. Corrugation
84. Dust
85. Pothole
86. Rutting
87. Loose Aggregate

### Distress Type

- Other
- Other
- Climate/Durability
- Other
- Climate/Durability
- Climate/Durability
- Other

# Appendix G

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## Micro PAVER Network Installation

There are two methods for using Micro PAVER in a networked environment. The two methods vary based on the labor involved in setting up the system, and the capabilities of the network.

### Method 1

This method sets up the Micro PAVER software on the network server, allowing up to two users at a time to use the system. However, there are some limitations to this method. Only one user can use certain features of PAVER (i.e. the work plan, condition analysis, and inspection scheduling) at a time. Also, each computer operating the software requires the system files for PAVER. In addition to creating the C:\EMS Program Files\User Data\ directory, PAVER installs several files in the C:\WINDOWS\SYSTEM\ directory. These are the files, referred to as system files, required to operate the tables and forms built in PAVER. To obtain the system files, it is necessary to install PAVER on the local machine. Since only the system files are necessary, it is possible to delete the CERL.ITS directory from the local computer that holds the main PAVER program. The main program is executed on the server. PAVER import/export features will not operate with this method. Any use of PAVER import or export features will lock other users out of the system.

### Method 2

This method involves installing Micro PAVER on each PC. The databases are then stored on the server. To store the databases on the server, create a directory to house all of the PAVER databases. A local machine which has the database installed will have several files, which need to be moved to the remote pavement database directory. The first file to be installed is in the EMS Program Files\User Data directory. The file will be called (database name).pvr and should have a corresponding directory with the name of the database. The directory also needs to be copied to the master pavement database directory on the server. However, the systems files are not transferable, and remain on the local machine. This method will support any number of users. Users can access the same database, but PAVER has record-level locking security, which means that no two people can edit the same elements of the database simultaneously. However, this eliminates the conflict of running multiple work plans on the same database, since each user essentially works off of a copy of the original database. The PAVER import/export features do operate on this setup, but any database that is involved in an import/export operation is inaccessible by other users. This method is typically the faster of the two.

***Note: The performance of the network systems will be decreased from the stand-alone Micro PAVER.***

# Appendix H

## Computing Work Quantity from Distress Quantity

1. We look in the “Work Conversion By Work Type” table given below. If the work type is there (which is currently only true for Slab Replacement – PCC, we say the work quantity is equal to the slab area.

Work Name	Conversion Type	Multiplier
<b>Slab Replacement – PCC</b>	<b>Slab Area</b>	<b>1</b>

2. If there is no conversion by work type, we try to look up the conversion by distress type, severity, and work unit type in the table given below. If a matching record is found, we take the amount given by the conversion type column (e.g., for distress 21, we use slab width) and multiply it by the distress quantity and the value in the multiplier column to get the work quantity. The conversion type definitions are:
  - a. Slab Width: Work quantity = distress quantity x slab width x multiplier
  - b. Slab Length: work quantity = distress quantity x slab length x multiplier
  - c. Slab Area: work quantity = (slab width x slab length) x distress quantity x multiplier.
  - d. Constant: Work quantity = distress quantity x multiplier
  - e. Joint Calculation: Work quantity = Joint Length x (distress quantity/number of slabs) x multiplier
  - f. Distress Area: Work quantity = distress area x multiplier
  - g. Slab Length + Width : Work quantity = (slab width + slab length) x distress quantity x multiplier
  - h. Patch Area: Work quantity = distress quantity + (0.6096 x SquareRoot(Distress quantity/Multiplier) x (multiplier + 1)) + 0.3716

Distress Code	Description	Severity	Work Unit Type	Conversion Type	Multiplier
1	ALLIGATOR CRACKING	Any	Any	Patch Area	1.25
2	BLEEDING	Any	Any	Distress Quantity	1
3	BLOCK CRACKING	Any	Any	Distress Quantity	1
4	BUMPS/SAGS	Any	Any	Distress Quantity	1
5	CORRUGATION	Any	Any	Patch Area	1.25
6	DEPRESSION	Any	Any	Patch Area	1.25
7	EDGE CRACKING	Any	Area	Distress Quantity	0.5
7	EDGE CRACKING	Any	Linear	Distress Quantity	1
8	JOINT REFLECTION CRACKING	Any	Area	Distress Quantity	0.5
8	JOINT REFLECTION CRACKING	Any	Linear	Distress Quantity	1
9	LANE/SHOULDER DROP	Any	Any	Distress Quantity	1
10	LONGITUDINAL/TRANSVERSE CRACKING			Distress Quantity	1
11	PATCH/UTILITY CUT	Any	Any	Patch Area	1.25
12	POLISHED AGGREGATE	Any	Any	Distress Quantity	1
13	POTHOLE	H	Any	Constant	0.83613
13	POTHOLE	M	Any	Constant	0.55742

Distress Code	Description	Severity	Work Unit Type	Conversion Type	Multiplier
13	POTHOLE	L	Any	Constant	0.27871
14	RAILROAD CROSSING	Any	Any	Distress Quantity	1
15	RUTTING	Any	Any	Distress Quantity	1
16	SHOVING	Any	Any	Patch Area	1.25
17	SLIPPAGE CRACKING	Any	Any	Patch Area	1.25
18	SWELL	Any	Any	Patch Area	1.25
19	WEATHERING/RAVELING	Any	Any	Distress Quantity	1
21	BLOW-UP/SHATTER	H	Linear	Slab Width	1
21	BLOW-UP/SHATTER	H	Area	Slab Width	2
21	BLOW-UP/SHATTER	L	Linear	Slab Width	1
21	BLOW-UP/SHATTER	L	Area	Slab Width	1
21	BLOW-UP/SHATTER	M	Linear	Slab Width	1
21	BLOW-UP/SHATTER	M	Area	Slab Width	1.5
22	CORNER BREAK	L	Area	Constant	3
22	CORNER BREAK	H	Area	Constant	3
22	CORNER BREAK	L	Linear	Constant	2.5
22	CORNER BREAK	H	Linear	Constant	2.5
22	CORNER BREAK	M	Area	Constant	3
22	CORNER BREAK	M	Linear	Constant	2.5
23	DIVIDED SLAB	Any	Linear	Width	1
23	DIVIDED SLAB	Any	Area	Slab Area	1
24	DURABILITY CRACKING	L	Linear	Slab Width	1
24	DURABILITY CRACKING	H	Area	Slab Area	1
24	DURABILITY CRACKING	L	Area	Slab Width	1
24	DURABILITY CRACKING	M	Linear	Slab Width	1
24	DURABILITY CRACKING	H	Linear	Width	1
24	DURABILITY CRACKING	M	Area	Slab Width	1.25
25	FAULTING	Any	Any	Slab Width	1
26	JOINT SEAL DAMAGE	Any	Area	Joint Calculation	0.3048
26	JOINT SEAL DAMAGE	Any	Linear	Joint Calculation	1
27	LANE/SHOULDER DROP	Any	Area	SlabLength	1
27	LANE/SHOULDER DROP	Any	Linear	Slab Length	1
28	LINEAR CRACKING	Any	Linear	Width	0.5
28	LINEAR CRACKING	Any	Area	Slab Area	1
29	LARGE PATCH/UTILITY CUT	Any	Area	Slab Width	1.5
29	LARGE PATCH/UTILITY CUT	Any	Linear	Slab Width	1
30	SMALL PATCH	Any	Linear	Constant	0.5
30	SMALL PATCH	Any	Area	Constant	0.25
31	POLISHED AGGREGATE	Any	Linear	Slab Length	1
31	POLISHED AGGREGATE	Any	Area	Slab Area	1
32	POPOUTS	Any	Linear	Slab Length	1
32	POPOUTS	Any	Area	Slab Area	1
33	PUMPING	Any	Linear	Slab Width	1
33	PUMPING	Any	Area	Slab Width	0.3048
34	PUNCHOUT	Any	Area	Slab Width	1.5
34	PUNCHOUT	Any	Linear	Slab Width	1
35	RAILROAD CROSSING	Any	Linear	Slab Width	1
35	RAILROAD CROSSING	Any	Area	Slab Width	1.5
36	SCALING/CRAZING	M	Area	Slab Width	1.25

Distress Code	Description	Severity	Work Unit Type	Conversion Type	Multiplier
36	SCALING/CRAZING	M	Linear	Slab Width	1
36	SCALING/CRAZING	L	Linear	Slab Width	1
36	SCALING/CRAZING	L	Area	Slab Width	1.25
36	SCALING/CRAZING	H	Linear	Width	1
36	SCALING/CRAZING	H	Area	Slab Area	1.25
37	SHRINKAGE CRACKING	Any	Linear	Constant	1.5
37	SHRINKAGE CRACKING	Any	Area	Constant	0.305
38	CORNER SPALLING	Any	Area	Constant	0.25
38	CORNER SPALLING	Any	Linear	Constant	0.5
39	JOINT SPALLING	L	Linear	Constant	0.5
39	JOINT SPALLING	M	Area	Slab Width	0.5
39	JOINT SPALLING	H	Area	Slab Width	0.5
39	JOINT SPALLING	M	Linear	Slab Width	0.5
39	JOINT SPALLING	L	Area	Slab Width	0.25
39	JOINT SPALLING	H	Linear	Slab Width	1
41	ALLIGATOR CRACKING	Any	Any	Patch Area	1.25
42	BLEEDING	Any	Any	Distress Quantity	1
43	BLOCK CRACKING	Any	Any	Distress Quantity	1
44	CORRUGATION	Any	Any	Patch Area	1.25
45	DEPRESSION	Any	Any	Patch Area	1.25
46	JET BLAST	Any	Any	Distress Quantity	1
47	JOINT REFLECTION CRACKING	Any	Linear	Distress Quantity	1
47	JOINT REFLECTION CRACKING	Any	Area	Distress Quantity	0.5
48	LONGITUDINAL/TRANSVERSE CRACKING	Any	Any	Distress Quantity	1
49	OIL SPILLAGE	Any	Any	Patch Area	1.25
50	PATCHING	Any	Any	Patch Area	1.25
51	POLISHED AGGREGATE	Any	Any	Distress Quantity	1
52	WEATHERING/RAVELING	Any	Any	Distress Quantity	1
53	RUTTING	Any	Any	Distress Quantity	1
54	SHOVING	Any	Any	Patch Area	1.25
55	SLIPPAGE CRACKING	Any	Any	Patch Area	1.25
56	SWELLING	Any	Any	Patch Area	1.25
61	BLOW-UP/SHATTER	L	Linear	Slab Width	1
61	BLOW-UP/SHATTER	H	Area	Slab Width	2
61	BLOW-UP/SHATTER	M	Area	Slab Width	1.5
61	BLOW-UP/SHATTER	H	Linear	Slab Width	1
61	BLOW-UP/SHATTER	M	Linear	Slab Width	1
61	BLOW-UP/SHATTER	L	Area	Slab Width	1
62	CORNER BREAK	M	Linear	Constant	2.5
62	CORNER BREAK	H	Area	Constant	3
62	CORNER BREAK	M	Area	Constant	3
62	CORNER BREAK	L	Area	Constant	3
62	CORNER BREAK	L	Linear	Constant	2.5
62	CORNER BREAK	H	Linear	Constant	2.5
63	LINEAR CRACKING	Any	Any	Width	0.5
63	LINEAR CRACKING	Any	Area	Slab Area	1
64	DURABILITY CRACKING	H	Linear	Width	1
64	DURABILITY CRACKING	M	Area	Slab Width	1.25
64	DURABILITY CRACKING	M	Linear	Slab Width	1

Distress Code	Description	Severity	Work Unit Type	Conversion Type	Multiplier
64	DURABILITY CRACKING	L	Area	Slab Width	1
64	DURABILITY CRACKING	L	Linear	Slab Width	1
64	DURABILITY CRACKING	H	Area	Slab Area	1
65	JOINT SEAL DAMAGE	Any	Area	Joint Calculation	0.3048
65	JOINT SEAL DAMAGE	Any	Linear	Joint Calculation	1
66	SMALL PATCH	Any	Linear	Constant	0.5
66	SMALL PATCH	Any	Area	Constant	0.25
67	LARGE PATCH/UTILITY CUT	Any	Linear	Slab Width	1
67	LARGE PATCH/UTILITY CUT	Any	Area	Slab Width	1.5
68	POPOUTS	Any	Area	Slab Area	1
68	POPOUTS	Any	Linear	Slab Length	1
69	PUMPING	Any	Linear	Slab Width	1
69	PUMPING	Any	Area	Slab Width	0.3048
70	SCALING/CRAZING	L	Area	Slab Width	1.25
70	SCALING/CRAZING	H	Area	Slab Area	1.25
70	SCALING/CRAZING	H	Linear	Width	1
70	SCALING/CRAZING	M	Linear	Slab Width	1
70	SCALING/CRAZING	L	Linear	Slab Width	1
70	SCALING/CRAZING	M	Area	Slab Width	1.25
71	FAULTING	Any	Any	Slab Width	1
72	DIVIDED SLAB	Any	Linear	Width	1
72	DIVIDED SLAB	Any	Area	Slab Area	1
73	SHRINKAGE CRACKING	Any	Area	Constant	0.3048
73	SHRINKAGE CRACKING	Any	Linear	Constant	1.5
74	JOINT SPALLING	L	Linear	Constant	0.5
74	JOINT SPALLING	L	Area	Slab Width	0.25
74	JOINT SPALLING	M	Linear	Slab Width	0.5
74	JOINT SPALLING	M	Area	Slab Width	0.5
74	JOINT SPALLING	H	Linear	Slab Width	1
74	JOINT SPALLING	H	Area	Slab Width	0.5
75	CORNER SPALLING	Any	Linear	Constant	0.5
75	CORNER SPALLING	Any	Area	Constant	0.25

# Glossary

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## **Check Box**

A Microsoft Windows standard user interface item for indicating a user selection. Check boxes are small square items that are displayed in an array for the user to make a selection(s) from. When the mouse is pointing to the check box and the left mouse button is clicked a check mark or 'X' will appear in the check box. Typically check boxes are used when more than one option can be selected from a list.

## **Critical PCI**

Defined as the PCI value at which the rate of PCI loss increases with time, or the cost of applying localized preventive maintenance increases significantly.

## **Drop Down Menu**

A Microsoft Windows standard menu, that is associated with a data entry form or grid. The drop down menu contains a list of the available selections for a data entry field. The drop list is not visible until the field associated with the drop list is selected by the user. When the Field is selected the drop list is activated by clicking the small down arrow located in the far right portion of the field mask. Alternately referred to as a picklist or drop list.

## **EMS Picture Server**

The EMS Picture Tool is an interface for storing images associated with a particular pavement database. Images can be associated with the a network, or assigned to individual branches and sections. It provides a convenient way to establish a pictorial record of database units.

## **EMS Query**

A PAVER for Windows tool used to temporarily select a subset of pavement sections for analysis or reporting. The application of a query to the active database does not cause any records in the database to changed or deleted. The query tool can also be used to specify the sort order of report results.

## **Family**

A pavement “family” is defined as a group of pavement sections with similar deterioration characteristics. The family model is estimated from the plot of observed age and condition measurements for pavements with similar attributes.

## **GIS**

Geographical Information System (GIS) refers to a system that presents data in the context of a map. GIS can be used to display PAVER inventory, condition, distress, cost and other pavement data as color-coded maps.

## **Global Preventive Maintenance & Repair (M&R)**

Defined as activities applied to entire pavement sections with the primary objective of slowing the rate of deterioration. This policy is applied to pavements above the critical PCI.

## **Localized Stop-Gap (Safety) Maintenance and Repair**

Stopgap M&R is defined as the localized M&R needed to keep the pavement operational in a safe condition. This policy is applied to pavements below the critical PCI.

## **Localized Preventive M&R**

Defined as distress maintenance activities performed with the primary objective of slowing the rate of deterioration. This policy is applied to pavements above the critical PCI.

## **Major M&R**

Activities applied to the entire pavement section to correct or improve existing structural or functional requirements. It is also used to upgrade pavements below the critical PCI.

## **Modal**

A Microsoft Windows form for displaying or collecting information. A modal form must be configured and executed or closed before you can resume other PAVER or Windows tasks.

## **Parameter Collection Screen**

A Microsoft Windows form that is used to configure the PAVER Condition Analysis, Work Plan and Inspection Schedule Reports. The parameter collection screens displays the default settings for the various report parameters that can be configured by the user. In general the values on the form can be adjusted to reflect the desired setting. The parameter collection screen is a modal screen.



## **PAT**

A Polygon Attribute Table (PAT) is a list used by a Geographical Information System (GIS) to relate database information (such as PAVER PCI values) to a GIS map location. In PAVERGIS the PAT is used to describe the sections in a PAVER database. Polygons are used in GIS to represent PAVER features (roads, parking lots, runways, aprons, etc) and then tabular data is attached to the features. A coverage is defined by several files. Some of the files contain graphical information, while others contain table information.

## **Pavement Condition Index (PCI)**

The PCI is the default condition index for the PAVER system. A numerical index, ranging from 0 for a failed pavement to 100 for a pavement in perfect condition. Calculation of the PCI is based on the results of a visual condition survey in which distress type, severity, and quantity are identified. It was developed to provide an index of the pavement's structural integrity and surface operational condition.

## **Pavement Network**

A logical unit for organizing pavements into a structure for the purpose of pavement management. A network will consist of one or more pavement branches, which in turn may consist of one or many pavement sections. The network is the point of origin for the hierarchy of pavement management structures.

## **Pavement Branch**

A branch is a readily identifiable part of the pavement network and has a distinct function. For example, an individual street or a parking lot would each be considered a separate branch of the pavement network. Similarly, an airfield pavement such as a runway or a taxiway would each be considered a separate branch.

## **Pavement Section**

A section should be viewed as the smallest management unit when considering the application and selection of M&R treatments. It is a logical unit assigned to a stretch of pavement that exhibits a common age, construction type, traffic and other criteria. The terminus or leaf point in the hierarchy of defined pavement management structures. A pavement section will be defined as a subordinate of a pavement branch, which in turn will be a subordinate of a parent pavement network.

## **PAVER Button Bar**

The array of eight buttons displayed across the top of the PAVER for Windows Desktop are used to invoke the most used PAVER for Windows features. Each button contains descriptive text and a graphic related to the function of the program the button launches.

## **PAVERGIS**

The program that transfers data from the PAVER (4.1 for Windows and 3.2g) environment to the GIS environment. It facilitates the process of linking pavement database information with representative objects in a GIS coverage.

**Picklist**

A Microsoft Windows standard menu associated with a data entry form or grid. The picklist menu contains a list of the available selections for a data entry field. The picklist is not visible until the field associated with the picklist is selected by the user. When the Field is selected the picklist is activated by clicking the small down arrow located in the far right portion of the field mask. Alternately referred to as a drop menu or drop list.

**PID**

Pavement Identification (PID) is the unique combination of pavement inventory information that makes a particular pavement section unique. The PID is formed from the network ID, branch ID and section ID.

**Structured Query Language (SQL)**

A standard database access language (collection of commands, control clauses, etc) supported by all major database managers. Structured Query Language, or SQL, provides a standard way to get or view information from a database, or put information into a database.

**Radio Button**

A Microsoft Windows standard user interface item for indicating a user selection. Radio buttons are small circular items that typically displayed in array for the user to make a mutually exclusive selection from.

**Report Viewer**

A standard PAVER for Windows interface used to display report results. The report viewer presents results as spreadsheet tables with associated graphs where applicable. The Condition Analysis Report, M&R Planning Report, and the Inspection Scheduling Report all present their results in the EMS Report Viewer format.

**Right Button Click Feature**

Added capabilities available for an object, either a PAVER spreadsheet table or a graph that are accessed by pointing to the object with the mouse and clicking the right mouse button.

**Tab Table Data**

The common PAVER for Windows data that is edited on Tab Table forms. Tab Table data includes the PAVER User Defined Fields tables, Inventory picklists, Work Plan tables, Materials, and Misc. Other Tables.

**Tab Table Form**

Microsoft standard form for editing and reviewing data. The Tab Table form simulates index cards that can be selected by pointing to the index tab portion of the card with the mouse and pressing the left mouse button.

## **User Defined Fields**

Discretionary inventory information that can be added to the existing attributes for networks, branches, and sections. A total of nine user defined fields are available, three for each inventory item.

## **View menu**

An item on the PAVER Menu, that is active only when the Report Viewer is the Active Window. The View Menu lists the available tables. Open tables have a check mark to the left of the menu item.

# Index

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## B

### **Basic PAVER Features 19–22**

- Adjusting Table and Graph Sizes 22
- Index Cards 20
- Printing Screen Images 22
- Spreadsheet Forms 19
- Tab Tables 21
- Units of Measurement 22

## C

### **Combine/Subset Database 37–38**

### **Condition Analysis Report 89–92**

- Analyzing Pavements 90–91
- Configuration 89
- Open Saved Report 92
- Overview 89
- Views 91–92

### **Condition Data Import (ASCII) 101**

### **Condition Data Import (Database) 102**

### **Condition Tools 35**

- Define Condition and Age Categories 35
- Define User Distress Indices 35
- Select Condition Types 35

### **Copy and Move Data 42**

## D

### **Database Verification Tools 41, 43**

### **Define User Fields 29–30**

- Additional User Fields 30
- Customize Table Headings and Width 30
- NSORT - BSORT - SSORT 29

## E

### **EMS Image Viewer 61–62**

- Edit an Image 62
- Other Image File Options 62
- Store an Image 61
- Viewing Images 62

### **EMS Tools in PAVER 23–27**

- EMS Query Tool 24
- Exiting the Report Viewer 27
- Report Viewer - Summary and Detail Options 25
- Report Viewer Tables 26
- Right Button Click on Graphs 24
- Right Button Click on Tables 23
- Using the EMS Query Tool 24
- View Menu - Display Specific Report Information 26

## F

### **Family Assignment 73–74**

- Change Family Assignments 73–74

### **Flexible Report 78–80**

- Create New Report 79
- Display a Memorized Report 78
- Edit Current Report 80

## G

### **GIS Assignment selection tool 45**

- Button Functions 46

### **GIS Reports 80–81**

- General Info 81
- Last PCI 80

## H

### **Handheld Data Import 102**

- Basic Software Operation 103
  - Process Overview 103
- Detailed Process 104
  - Backup Inspection Data 106
  - Download Sections to Inspect 104
  - Import Backup Data into PAVER 107
  - Inspections Using the Handheld PCI Inspector 105
- Hardware/Software Requirements 102
- Software Installation 102

## I

### **Import / Export 38–40**

5.0 Export Procedure 38–39

5.0 Import Procedure 39–40

### **Inspection Data Import (PAVER Database) 70**

### **Inspection Schedule 71–72**

Open Saved Report 72

Report 71–72

### **Inventory 55–63**

Definition 55–60

Branch Creation 57–58

Conditions/Families 60

Managing Pavement Inventory 55–56

Network Creation 56

Section Creation 58–59

Traffic 63

### **Inventory Pick Lists 31**

## M

### **M&R Plan 93–100**

Analyzing M&R Activity 98

Configuration 93

Detail View 99–100

Open Saved Report 100

Plan Mode 94–95

Policies and Costs 96–98

Scope 93

Summary View 98–99

Timing 94

### **M&R Plan Tables 31–34**

Budgets 34

Global M&R 32

Localized M&R 32

M&R Cost by Condition 33

Major M&R 32–33

### **Misc. Other Tables 35–36**

Aircraft Type 35

Layer Construct 36

Materials 36

Unit of Measure (Field) Settings 36

## O

### **Other Conditions 69**

User-Editable Condition Indices 69

## P

### **PAVER Organization 17–18**

### **PAVER Shape File Converter**

Converting from PAVER 4.x to 5.0 49

Procedure 49

### **PCI and Distress Indices 65–69**

Batch Inspection Data Entry 68

Calculating the PCI after Inspection 69

Entering Inspection Dates and Samples 65–67

Entering Inspection Information 67

Field Inspection - Basic Operations 65

Keyboard Entry 68

### **Prediction Model 83–87**

Assign Family 87

Building Family Models 83

Options 86

Other Condition Prediction Model Features 87

Review Model Data 85

Use Boundary/Outlier 85–86

Using the Prediction Model 83–84

View Equation and Stats 86

## R

### **Re-Inspection Report 77–78**

## S

### **Selectors 51–53**

GIS Selector 52

Navigating the Pavement Inventory 51

Tab Selector 52

Tree and GIS Selector 53

Tree Selector 51

### **Shape File Coordinate Shift 49**

### **Standard Reports 76–77**

### **Summary Charts 75**